
Health and Safety Plan

Operable Unit No. 1
Pre-design Investigation

for the

Diamond Head Oil Superfund Site
Kearny, New Jersey

Prepared for:
U.S. Army Corps of Engineers
Kansas City District

700 Federal Building, Kansas City, MO

September 2013



CH2MHILL

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299616



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ATTACHMENTS

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Attachment 2	Chemical Inventory/Register Form
Attachment 3	Chemical-Specific Training Form
Attachment 4	Project Activity Self-Assessment Checklists/Forms/Permits
Attachment 5	Behavior Based Loss Prevention Forms
Attachment 6	Material Safety Data Sheets/Fact Sheets
Attachment 7	Working Alone Standard
Attachment 8	Tick Fact Sheet
Attachment 9	Observed Hazard Form
Attachment 10	Stop Work Order Form
Attachment 11	Material Safety Data Sheets
Attachment 12	CH2M HILL Health and Safety Standard Operating Procedures (on attached DVD)

Approval

This site-specific Health and Safety Plan (HSP) has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions and identified scope(s) of work and must be amended if those conditions or scope(s) of work change.

By approving this HSP, the Responsible Health and Safety Manager (RHSM) certifies that the personal protective equipment has been selected based on the project-specific hazard assessment.

Original Plan

RHSM Approval: Steve Beck

Date: June 12, 2002

Field Operations Manager Approval: Juliana Hess

Date: June 12, 2002

Revisions 1

Revisions Made By: Austin Harclerode

Date: August 19, 2010

Description of Revisions to Plan (added Task Activities and Safety Protocols for):

- Test Pitting/Excavation
 - Vegetation Clearance (Heavy Machinery)
 - Fence Install
 - Drilling
 - Converted HASP to new Corporate Template
-

Revisions Approved By: Carl Woods

Date: August 31, 2010

Revisions 2

Revisions Made By: David Reamer

Date: June 7, 2011

Description of Revisions to Plan (added Task Activities and Safety Protocols for):

- Collection of soil samples via hand auguring methods
 - Collection of sediment samples
 - Collection of fish tissue samples from Frank's Creek and the drainage swale
 - Collection of mammal tissue from via onsite traps
 - Added dioxin and furan results to chemicals of concern
-

Revisions Approved By: Cindy Collins for Carl Woods

Date: June 08, 2011

Revisions 3

Revisions Made By: Austin Harclerode

Date: December 12, 2012

Description of Revisions to Plan (added Task Activities and Safety Protocols for):

- Vegetation Clearance
- Heavy/Earthmoving Equipment
- Temporary Road Construction
- Drilling/piezometer installation
- Radiation monitoring standard for test pits
- Added additional/updated dioxin and furan results to chemicals of concern

Revisions Approved By: Carl Woods

Date: December 20, 2012

Revisions 4

Revisions Made By: David Reamer

Date: August 26, 2013

Description of Revisions to Plan (added Task Activities and Safety Protocols for):

- Revisions to text based on comments received from USACE. Corrected pagination, added attachment 12 which includes referenced HSE SOPs and clarified a few portions of the report text.

Revisions Approved By: Mark Orman

Date: September 23, 2013

1.0 Introduction



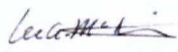
Health, Safety, and Environment Policy Commitment

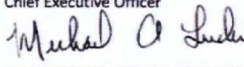
Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance. CH2M HILL deploys an integrated, enterprise-wide behavior based HSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

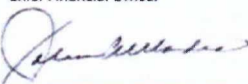
- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for their fellow employees to prevent injuries, illnesses, and adverse environmental impacts, and create a safe, healthy, and environmentally-responsible workplace.
- We provide value to clients by tailoring HSE processes to customer needs and requiring CH2M HILL employees and subcontractors to deliver projects that identify HSE requirements and commit to compliance with applicable HSE laws and regulations, company standards, and external requirements.
- We are committed to pollution prevention in conjunction with our Sustainability Policy and by offering our clients sustainable solutions.
- We aspire to continually improve our performance and influence others to redefine world-class HSE excellence.
- We evaluate our design engineering and physical work environment to verify safe work conditions and practices are established, followed, and corrected as needed.
- We assess and continually improve our HSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely evaluating our program.
- We expect all employees to embrace our Target Zero culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and "walk the talk" on and off the job.

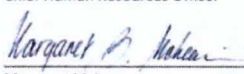
The undersigned pledge our leadership, commitment, and accountability for making this Policy a reality at CH2M HILL.

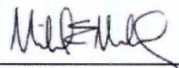
Dated the 2nd of October, 2012

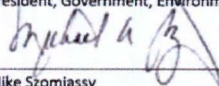

Lee McIntire
Chief Executive Officer

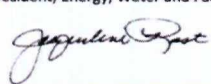

Mike Lucki
Chief Financial Officer

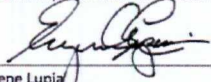

John Madia
Chief Human Resources Officer


Margaret McLean
Chief Legal Officer


Mike McKelvy
President, Government, Environment, and Infrastructure Division


Mike Szomjassy
President, Energy, Water and Facilities Division


Jacqueline Rast
President, International Division


Gene Lupia
President, Government Facilities and Infrastructure Business Group
Enterprise Delivery Excellence

1.1 HILL Policy and Commitment

1.1.1 Safe Work Policy

It is the policy of CH2M HILL to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and we are dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner;
- Stop work immediately to correct any unsafe condition that is encountered; and
- Take corrective actions so that work may proceed in a safe manner.

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into quality control, cost reduction, and job performance, and are crucial to our success.

1.1.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for health and safety excellence. The primary driving force behind this commitment to health and safety is simple: employees are CH2M HILL's most significant asset and CH2M HILL management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. CH2M HILL's safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in health and safety and also understands that world-class performance in health and safety is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. The ultimate success of CH2M HILL's safety program depends on the full cooperation and participation of each employee.

CH2M HILL management extends its full commitment to health and safety excellence.

1.1.3 Project-Specific Health, Safety, and the Environment Goals

All management and employees are to strive to meet the project-specific Health, Safety, and the Environment (HSE) goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the health and safety of all project personnel and, therefore, making the project a great success.

The Project has established eleven specific goals and objectives:

- Create an injury-free environment;
- Have zero injuries or incidents;
- Provide management leadership for HSE by communicating performance expectations, reviewing and tracking performance, and leading by example;
- Ensure effective implementation of the HSP through education, delegation, and team work;

- Ensure 100 percent participation in HSE compliance;
- Continuously improve our safety performance;
- Maintain free and open lines of communication;
- Make a personal commitment to safety as a value;
- Focus safety improvements on high-risk groups;
- Continue strong employee involvement initiatives; and
- Achieve health and safety excellence.

2.0 Applicability

This HSP applies to:

- All CH2M HILL staff, including subcontractors and tiered subcontractors of CH2M HILL working on the site; and
- All visitors to the construction site in the custody of CH2M HILL (including visitors from the Client, the Government, the public, and other staff of any CH2M HILL company).

This HSP does not apply to the third-party contractors, their workers, their subcontractors, their visitors, or any other persons not under the direct control or custody of CH2M HILL.

This HSP defines the procedures and requirements for the health and safety of CH2M HILL staff and visitors when they are physically on the work site. The work site includes the project area (as defined by the contract documents) and the project offices, trailers, and facilities thereon.

This HSP will be kept onsite during field activities and will be reviewed as necessary. The HSP will be amended or revised as project activities or conditions change or when supplemental information becomes available. The HSP adopts, by reference, the Enterprise-wide Core Standards and Standard Operating Procedures (SOPs) which are included in Attachment 12 as appropriate. In addition, the HSP may adopt procedures from the project Work Plan and any governing regulations. If there is a contradiction between this HSP and any governing regulation, the more stringent and protective requirement shall apply.

All CH2M HILL staff and subcontractors must sign the employee sign-off form included in this document as Attachment 1 to acknowledge review of this document. Copies of the signature page will be maintained onsite by the Safety Coordinator (SC).

3.0 General Project Information

3.1 Project Information and Background

PROJECT NO: 402358.01.05.03

CLIENT: United States Army Corps of Engineers, Huntsville District & United States Environmental Protection Agency, Region II.

PROJECT/SITE NAME: Diamond Head Oil Refinery

SITE ADDRESS: VACANT LOT, adjacent to 1235 Harrison Avenue (Campbell Foundry), Kearny, New Jersey 07032 (Hudson Co.)

CH2M HILL PROJECT MANAGER: Juliana Hess/NJO

CH2M HILL OFFICE: 119 Cherry Hill Road
Suite# 300
Parsippany, NJ 07054

DATE HASP PREPARED: 05/17/2002

DATE HASP REVISED: December 20, 2012

DATE(S) OF SITE WORK: March 2013 – June 2013

SITE ACCESS: Locked gate off Harrison Ave.

SITE SIZE: 15 acres

SITE TOPOGRAPHY: Flat with slight rise demarcating on-site landfill area

PREVAILING WEATHER: The moderate continental climate varies between average highs around 85° F in July to average lows near 23° F in January. The average amount of precipitation is 3.5 inches per month.

3.2 Site Background and Setting

The site is a former oil refinery operation where dumping has occurred. Approximately 1/2 of the site (7 acres) is occupied by a landfill of construction and other miscellaneous debris. A geophysical survey has revealed no areas of buried drums. The other half of the site was occupied by tanks, a 5-acre oil lagoon and two buildings. The oil lagoon has been excavated and filled in and only the foundations of the building are currently present. Historic information suggests the presence of LNAPL which CH2M Hill will attempt to remediate during the next phase(s) of work.

3.3 Description of Tasks

Refer to project documents (i.e., Work Plan) for detailed task information. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin. Refer to the "Site Control" section of this HSP for procedures related to "clean" tasks that do not involve hazardous waste operations and emergency response (HAZWOPER).

3.3.1 Hazwoper-Regulated Tasks

- Collection of subsurface soil samples (from direct push drilling soil cores)
- Direct push drilling
- Piezometer installation
- Temporary road construction
- Vegetation clearance of 10 acres (and tools/equipment)
- Groundwater sample collection
- Synoptic groundwater elevation and LNAPL thickness measurement events
- Survey
- IDW Sampling/Mgmt.

3.3.2 Non-Hazwoper-Regulated Tasks

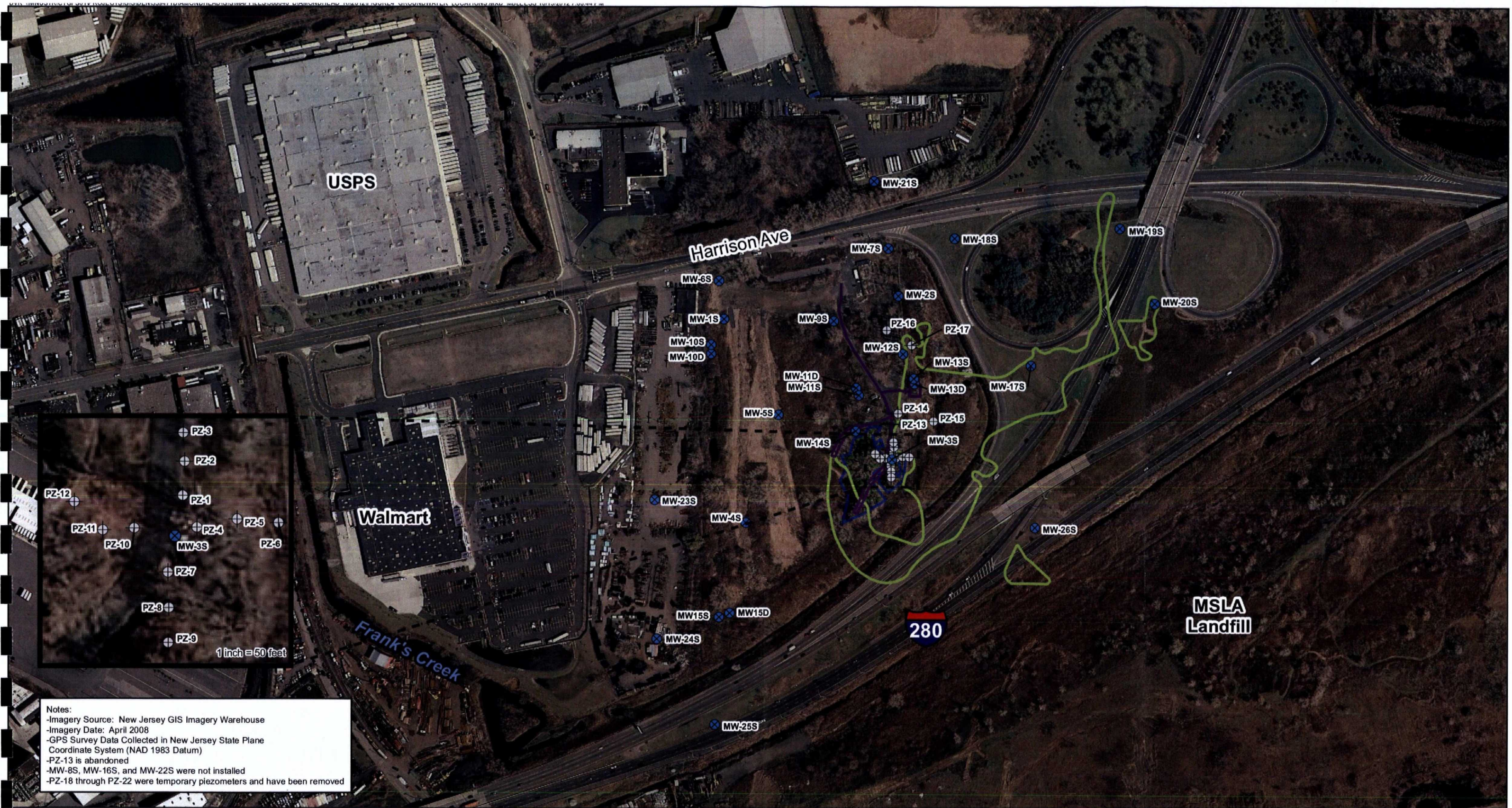
Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Contact the Responsible Health and Safety Manager prior to using non-Hazwoper-trained personnel for the following tasks when working on a regulated hazardous waste site.**

TASKS

- Utility Location through NJ-One Call

CONTROLS

- Brief on hazards, limits of access, and emergency procedures.
- Post areas of contamination as appropriate.
- Perform air sampling/monitoring as specified in this HSP.



Notes:
-Imagery Source: New Jersey GIS Imagery Warehouse
-Imagery Date: April 2008
-GPS Survey Data Collected in New Jersey State Plane
Coordinate System (NAD 1983 Datum)
-PZ-13 is abandoned
-MW-8S, MW-16S, and MW-22S were not installed
-PZ-18 through PZ-22 were temporary piezometers and have been removed

- Legend**
- Monitoring Well Location
 - Piezometer
 - Temporary Gravel Road
 - Extent of Former Lagoon (1976 Aerial Photo)
 - Delineated Wetlands

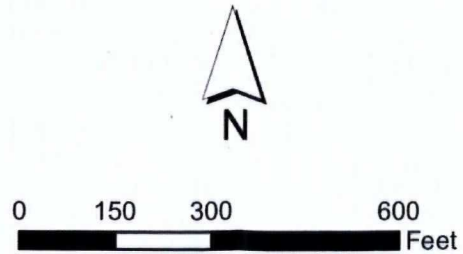


Figure 1
Site Plan
OU1 Pre-Design Investigation
Diamond head Oil Superfund Site
Kearny, NJ

4.0 Project Organization and Responsibilities

4.1 Client

Contact Name: U.S. Army Corps of Engineers – Elizabeth Buckrucker
Phone: 916-389-3581

4.2 CH2M HILL

4.2.1 Project Manager

Project Manager Name: Juliana Hess
Job Title: Project Manager
CH2M HILL Office: New Jersey
Telephone Number: (973) 316-3520
Cellular Number: (201) 602-1557

The project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
 - Choosing potential subcontractors based on technical ability and HSE performance;
 - Implementing the subcontractor prequalification process;
 - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award; and
 - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization.
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices per the site-specific safety plans and procedures.
- Manage the site and interfacing with 3rd parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.
- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.

- Promptly report all work-related HSE incidents or near misses.
- Wear any required personal protective equipment.
- Ensure CH2M HILL employees complete required HSE training within established timelines.
- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes and training.

4.2.2 CH2M HILL Responsible Health and Safety Manager

RHSM Name: Carl Woods
 Job Title: Health and Safety Manager
 CH2M HILL Office: Cincinnati
 Telephone Number: (513) 889-5771
 Cellular Number (513) 319-5771

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process;
- Approve HSP and its revisions as well as Activity Hazard Analyses (AHA);
- Review and evaluate subcontractor site-specific safety procedures for adequacy prior to start of subcontractor's field operations;
- Support the oversight (or SC's direct oversight) of subcontractor and tiered subcontractor HSE practices;
- Permit upgrades/downgrades in respiratory protection after reviewing analytical data;
- Conduct audits as determined by project schedule and coordination with PM; and
- Participate in incident investigations, lessons learned, loss/near loss reporting.

4.2.3 CH2M HILL Project Environmental Manager

EM Name: Teri Gerrish
 CH2M HILL Office: NJO
 Telephone Number: 973-316-3516
 Cellular Number: 973- 632-0238

The Project EM is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan;
- Review and evaluate qualifications for subcontractors with a history of environmental non-compliance and for waste transportation and disposal subcontractors;
- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements; and
- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

4.2.4 CH2M HILL Safety Coordinator

SC Name: Austin Harclerode
Job Title: Environmental Scientist
CH2M HILL Office: New Jersey
Telephone Number: (973) 316-3518
Cellular Number: (201) 532-2885

The SC is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify this HSP is current and amended when project activities or conditions change;
- Verify CH2M HILL site personnel and subcontractor personnel read the HSP and sign the Employee Sign-Off Form, prior to commencing field activities;
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, among others) and medical surveillance as identified in this HSP;
- Verify that project files available to site personnel include copies of executed subcontracts and subcontractor certificates of insurance (including CH2M HILL as named additional insured), bond, contractor's license, training and medical monitoring records, and accepted site-specific safety procedures prior to start of subcontractor's field operations;
- Act as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in the HSP;
- Act as the project "Emergency Response Coordinator" and perform the responsibilities outlined in the HSP;
- Post the Occupational Safety and Health Administration (OSHA) job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established;
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change);
- Verify that project health and safety forms and permits are being used as outlined this HSP;
- Perform oversight and assessments of subcontractor HSE practices per the site-specific safety plan and verify that project activity self-assessment checklists are being used as outlined this HSP;
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and 3rd party interfaces;
- Verify appropriate personal protective equipment (PPE) use, availability, and training;
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented;
- Conduct accident investigations including root cause analysis;
- Calibrate and conduct air monitoring in accordance with the HSP; maintain all air monitoring records in project file;
- Maintain HSE records and documentation;
- Facilitate OSHA or other government agency inspections including accompanying inspector and providing all necessary documentation and follow-up;
- Deliver field HSE training as needed based on project-specific hazards and activities;
- Contact the RHSM and PM in the event of an incident;

- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate; and
- Document all oral health and safety-related communications in project field logbook, daily reports, or other records.

4.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts and Subcontracts* – see Attachment 12)

Subcontractor: TO BE UPDATED AFTER PROCUREMENT COMPLETED

Subcontractor Contact Name:

Telephone:

Subcontractor:

Subcontractor Contact Name:

Telephone:

Subcontractors must comply with the following activities, and are responsible to:

- Comply with all local, state, and federal safety standards;
- Comply with project and owner safety requirements;
- Actively participate in the project safety program and either hold or attend and participate in all required safety meetings;
- Provide a qualified safety representative to interface with CH2M HILL;
- Maintain safety equipment and PPE for their employees;
- Maintain and replace safety protection systems damaged or removed by the subcontractor's operations;
- Notify the SC of any accident, injury, or incident immediately and submit reports to CH2M HILL within 24 hours;
- Install contractually required general conditions for safety (for example, handrail, fencing, fall protection systems, floor opening covers);
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas;
- Conduct site-specific and job-specific training for all subcontractor employees, including review of the CH2M HILL HSP, subcontractor HSPs, and subcontractor AHAs and sign appropriate sign-off forms; and
- Determine and implement necessary controls and corrective actions to correct unsafe conditions.

The subcontractors listed above may be required to submit their own site-specific HSP and other plans such as lead or asbestos abatement compliance plans. Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit their plans to CH2M HILL for review and acceptance before the start of field work.

Subcontractors are also required to prepare AHAs before beginning each activity posing hazards to their personnel. The AHA shall identify the principle steps of the activity, potential health and safety hazards for each step and recommended control measures for each identified hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements, and training requirements for the safe operation of the equipment listed must be identified.

4.4 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

Each employee is responsible for the following performance objectives:

- Perform work in a safe manner and produce quality results;
- Perform work in accordance with company policies, and report injuries, illnesses, and unsafe conditions;
- Complete work without injury, illness, or property damage;
- Report all incidents immediately to supervisor, and file proper forms with a human resources representative;
- Report all hazardous conditions and/or hazardous activities immediately to supervisor for corrective action; and
- Complete an HSE orientation prior to being authorized to enter the project work areas.

4.4.1 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work and during employee orientation, each employee will be informed of their authority to do so.

4.5 Client Contractors

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts and HSE Management Practices*– see Attachment 12)

*** No client contractors will be utilized for onsite work during this phase of the project.**

Contractor: N/A Contact Name: Telephone: Contractor Task(s):

This HSP does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and we must never assume such responsibility through our actions (such as advising on health and safety issues). In addition to these instructions, CH2M HILL team members should review contractor safety plans so that we remain aware of appropriate precautions that apply to us. Self-assessment checklists are to be used by the SC and CH2M HILL team members to review the contractor's performance only as it pertains to evaluating CH2M HILL exposure and safety. The RHSM is the only person who is authorized to comment on or approve contractor safety procedures.

Health and safety-related communications with contractors should be conducted as follows:

- Request the contractor to brief CH2M HILL team members on the precautions related to the contractor's work;
- When an apparent contractor non-compliance or unsafe condition or practice poses a risk to CH2M HILL team members:
 - Notify the contractor safety representative;
 - Request that the contractor determine and implement corrective actions;
 - If necessary, stop affected CH2M HILL work until contractor corrects the condition or practice; and
 - Notify the client, PM, and RHSM as appropriate.

If apparent contractor non-compliance or unsafe conditions or practices are observed, inform the contractor safety representative (CH2M HILL's obligation is limited strictly to informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative (CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of the observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions).

All verbal health and safety-related communications will be documented in project field logbook, daily reports, or other records.

5.0 Standards of Conduct

All individuals associated with this project must work injury-free and drug-free and must comply with the following standards of conduct, the HSP, and the safety requirements of CH2M HILL. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts.

5.1 Standards of Conduct Violations

All individuals associated with this project are expected to behave in a professional manner. Violations of the standards of conduct would include, but not be limited to:

- Failure to perform work;
- Inefficient performance, incompetence, or neglect of work;
- Willful refusal to perform work as directed (insubordination);
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions;
- Unexcused or excessive absence or tardiness;
- Unwillingness or inability to work in harmony with others;
- Discourtesy, irritation, friction, or other conduct that creates disharmony;
- Harassment or discrimination against another individual;
- Failure to be prepared for work by wearing the appropriate construction clothing or bringing the necessary tools; or
- Violation of any other commonly accepted reasonable rule of responsible personal conduct.

5.2 Disciplinary Actions

The Environmental Services (ES) business group employees, employees working on ES business group projects, and subcontractor employees are subject to disciplinary action for not following HSE rules and requirements. Potential disciplinary action is equally applicable to all employees including management and supervision. Disciplinary action may include denial of access to the worksite, warnings, reprimands, and other actions up to and including termination depending on the specific circumstances.

5.3 Subcontractor Safety Performance

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their plans and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

5.3.1 Observed Hazard Form

When apparent non-compliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor or safety representative verbally, and document using the Observed Hazard Form, included as an attachment to this HSP, and require corrective action.

If necessary, stop subcontractor's work using the Stop Work Order Form until corrective actions is implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document corrective actions have been taken. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.

5.3.2 Stop Work Order

CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work in the event any CH2M HILL employee observes unsafe conditions or failure of the subcontractor to adhere to its safe-work practices. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor staff from the danger, notify the subcontractor's supervisor or safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, Contract Administrator (KA) and RHSM.

When repeated non-compliance or unsafe conditions are observed, notify the subcontractor's supervisor or safety representative and stop affected work by completing and delivering the Stop Work Order Form (attached to this HSP) until adequate corrective measures are implemented. Consult the KA to determine what the contract dictates for actions to pursue in event of subcontractor non-compliance including work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, or termination of subcontractor for cause.

5.4 Incentive Program

Each project is encouraged to implement a safety incentive program that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, or stopping a crew member from doing something unsafe. The program will operate throughout the project, covering all workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

5.5 Reporting Unsafe Conditions/Practices

Responsibility for effective health and safety management extends to all levels of the project and requires good communication between employees, supervisors, and management. Accident prevention requires a pro-active policy on near misses, close calls, unsafe conditions, and unsafe practices. All personnel must report any situation, practice, or condition which might jeopardize the safety of our projects. All unsafe conditions or unsafe practices will be corrected immediately. CH2M HILL has zero tolerance of unsafe conditions or unsafe practices.

No employee or supervisor will be disciplined for reporting unsafe conditions or practices. Individuals involved in reporting the unsafe conditions or practices will remain anonymous.

The following reporting procedures will be followed by all project employees:

- Upon detection of any unsafe condition or practice, the responsible employee will attempt to safely correct the condition;
- The unsafe condition or practice will be brought to the attention of the worker's direct supervisor, unless the unsafe condition or practice involves the employee's direct supervisor. If so, the SC needs to be notified at once by the responsible employee;
- Either the responsible employee or responsible employee's direct supervisor is responsible for immediately reporting the unsafe condition or practice to the SC;
- The SC will act promptly to correct the unsafe condition or practice; and
- Details of the incident or situation will be recorded by the SC in the field logbook or use the Observed Hazard Form if subcontractor was involved.

6.0 Safety Planning and Change Management

6.1 Daily Safety Meetings and Pre-Task Safety Plans

Daily safety meetings are to be held with all project personnel in attendance to review the hazards posed and required HSE procedures and AHAs that apply for each day's project activities. The Pre-Task Safety Plans (PTSPs) serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews.

At the start of each day's activities, the crew supervisor completes the PTSP, provided as an attachment to this HSP, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required HSE procedures, as identified in the HSP and AHA. The use of PTSPs promotes worker participation in the hazard recognition and control process while reinforcing the task-specific hazard and required HSE procedures with the crew each day.

6.2 Change Management

The evaluation form below should be reviewed on a continuous basis to determine if the current site health and safety plan adequately addresses ongoing project work, and should be completed whenever new tasks are contemplated or changed conditions are encountered.

This HSP addresses all known activities and associated hazards. As work progresses, if significant changes are identified which could affect health and safety at the site, coordinate with the RHSM to determine whether a HSP update is necessary.

The following are examples of changes that may require a revision to the plan:

- Change in CH2M HILL staff;
- New subcontractor to perform work;
- New chemicals brought to site for use;
- Change in scope or addition of new tasks;
- Change in contaminants of concern (COCs) or change in concentrations of COCs; and
- New hazards or hazards not previously identified that are not addressed in this HSP.

(See checklist below)

PROJECT HSE Change Management FormProject Task: **OU1 PDI**Project/Task Manager: **Juliana Hess/NJO**Project Number: **402358**Project Name: **Diamond Head**

Evaluation Checklist		Yes	No
1.	Has the CH2M HILL staff listed in the original HSP changed?		
2.	Has a new subcontractor been added to the project?		
3.	Is any chemical or product to be used that is not listed in Attachment 2 of the plan?		
4.	Have additional tasks been added which were not originally addressed in the "Project Information" section of this HSP?		
5.	Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6.	Has other safety, equipment, activity or environmental hazards been encountered that are not addressed in this HSP?		

If the answer is "YES" to the questions above, HSP revision may be needed. For questions 2-6, contact RHSM prior to continuing work. In addition to contacting the RHSM, the following actions can be taken for questions 1-3:

- Confirm that staff's medical and training status is current – check training records at: <http://www.int.ch2m.com/hands> (or contact your regional safety program assistant [SPA]), and confirm subcontractor qualifications.
- Confirm with the project RHSM that subcontractor safety performance has been reviewed and is acceptable.
- Confirm with the RHSM that subcontractor safety procedures, plans, and/or AHAs have been reviewed and are acceptable.
- Add the new chemical or product information to the Chemical Inventory Form, inform the RHSM, and ensure that personnel handling the chemical or product have been trained, and that training is documented using the Chemical-Specific Training Form included as an attachment to this HSP. Add the Material Safety Data Sheet(s) (MSDS) for chemicals handled or used at the project to this HSP. AHAs may need to be developed or amended to account for new chemicals. The RHSM shall review the AHAs prior to the chemical use.

6.3 Agency Inspection Guidance

(Reference CH2M HILL SOP HSE-201, *Agency Inspections and Communications*– see Attachment 12)

Agency inspections (e.g., OSHA, EPA, other regulatory agencies) are on the rise. CH2M HILL implements safety and environmental programs in order to ensure safety to workers, the public, and the environment. This plan addresses things like labeling containers, completing the hazard communication training using the attachments to this HSP, listing training requirements and PPE requirements, and addressing project-specific hazards. Field personnel need to contact the RHSM to update this plan if hazards are encountered that are not addressed.

SOP HSE-201 (included in Attachment 12) addresses agency inspections in detail, and the attached **Target Zero Bulletin on Agency Inspections** provides a good summary of the inspection process and what to do if an agency such as OSHA or EPA shows up at the site. It is critical immediate notification or the RHSM if an inspector arrives (and EM if it is environmental-related); they can help facilitate and make additional notifications.

7.0 Project Hazard Analysis

A health and safety risk analysis (Table 1) has been performed for each task. In the order listed below, the RHSM considers the various methods for mitigating the hazards. Employees are trained on this hierarchy of controls during their hazardous waste training and reminded of them throughout the execution of projects:

- Elimination of the hazards (use remote sampling methodology to avoid going into a confined space);
- Substitution (reduce exposure to vapors by using of a geoprobe instead of test pitting);
- Engineering controls (ventilate a confined space to improve air quality);
- Warnings (establish exclusion zones to keep untrained people away from hazardous waste work);
- Administrative controls (implement a work-rest schedule to reduce chance of heat stress); or
- Use of PPE (use of respirators when action levels are exceeded).

The hazard controls and safe work practices are summarized in the following sections of this HSP:

- General hazards and controls;
- Project-specific hazards and controls;
- Physical hazards and controls;
- Biological hazards and controls; and
- Contaminants of concern

7.1 Activity Hazard Analysis

An AHA defines the activity being performed, the hazards posed and control measures required to perform the work safely. Workers are briefed on the AHA before doing the work and their input is solicited prior, during, and after the performance of work to further identify the hazards posed and control measures required. The AHA shall identify the work tasks required to perform each activity, along with potential HSE hazards and recommended control measures for each hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements and training requirements for the safe operation of the equipment listed must be identified. The following hazard controls and applicable CH2M HILL core standards and SOPs should be used as a basis for preparing AHAs.

AHAs must be prepared for CH2M HILL activities and included as an attachment to this HSP.

7.2 Subcontractor Activity Hazard Analysis

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their scope of work, along with their project-specific safety plan and/or procedures. Additions or changes in field activities, equipment, tools, or material used to perform work or hazards not addressed in existing AHAs requires either a new AHA to be prepared or an existing AHA to be revised.

Table 1 – General Activity Hazard Analysis

Potential Hazard	Project Activity	Subsurface soil sampling	Direct Push Drilling	Groundwater Sampling	Vegetation Clearance	Temporary Road Construction	Test Pit Excavations	Survey	IDW Mgmt
Benzene		X	X	X			x		X
Biological Hazards		X	X	X	X	x	x	X	X
Cadmium		X	X	X			x		X
Chemical Hazard		X	X	X			x		X
Compressed Gas Cylinders		X							
Drum Handling		X	X	X			x		X
Drum Sampling		X	X	X			x		X
Dry Ice Hazards									
Electrical Safety		X	X	X		x	x		
Excavations Hazards							x		
Field Vehicles		X	X	X	X	x	x	X	X
Fire Prevention		X	X	X	X	x	x	X	X
Hand & Power Tools		X	X	X	X	x	x	X	X
Haul Truck Operations						x			
Knife Use		X	X	X	X	x	x	X	X
Lead		X	X	X			x		X
Manual Lifting		X	X	X	X	x	x	X	X
Stream Crossing		X	X	X		x			
Temperature Extremes		X	X	X	X	x	x	X	X
Traffic Control		X	X	X		x	x	X	
Ultraviolet Light exposure (sunburn)		X	X	X	X	x	x	X	X
Utilities (underground/overhead)		X					x		
Vinyl Chloride		X	X	X			x		X
Visible Lighting		X	X	X	X	x	x	X	X
Work near water		X	X	X	X	x	x	x	

8.0 General Hazards and Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. It is a summarized list of requirements. Always consult the appropriate CH2M HILL SOP to ensure all requirements are implemented.

8.1 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*– see Attachment 12)

Exposure to bloodborne pathogens may occur when rendering first aid or cardiopulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne pathogens computer-based training module annually. When performing first-aid/CPR the following shall apply:

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials;
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes; and
- If necessary, decontaminate all potentially contaminated equipment and surfaces with chlorine bleach as soon as possible. Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. This examination includes the following procedures:

- Documenting the exposure;
- Testing the exposed employee's and the source individual's blood (with consent); and
- Administering post-exposure prophylaxis.

8.2 Chemical Storage

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases;
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals);
- Keep flammables and corrosives in appropriate storage cabinets;
- Do not store paper or other combustibles near flammables;
- Use secondary containment and lipped shelving that is secured; and
- Have a fire suppression system available.

8.2.1 Storage of Flammable/Combustible Liquids

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons (19 liters) or less. Do not use plastic gas cans.
- For quantities of 1 gallon (3.78 liters) or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

8.2.2 Indoor Storage of Flammable/Combustible Liquids

- No more than 25 gallons (95 liters) of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons (95 liters) shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons (228 liters) of flammable or 120 gallons (456 liters) of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

8.2.3 Outside Storage of Flammable/Combustible Liquids

- Storage of containers (not more than 60 gallons [228 liters] each) shall not exceed 1,100 gallons (4180 liters) in any one area. No area shall be within 20 feet (6.1 meters) of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas may not be located near a storm drain. Overflow and spills must be diverted away from storm drains or surface waters.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet (6.1 meters) to any building.
- Signs indicating no smoking shall be posted around the storage area.

8.2.4 Storage of Hazardous Waste

- All facilities storing ignitable and combustible liquids and hazardous wastes must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any release of hazardous constituents.
- Flammable wastes should be stored more than 50 feet from the property line.

8.2.5 Storage of Chemical Injection Chemicals/Materials

When chemical injection remediation technologies are being used at a site, the following storage guidelines must be followed:

- Some injection chemicals, such as strong oxidizers, may have stringent storage requirements per local or National Fire Codes. Verify that appropriate storage provisions are in place prior to starting work.

NOTE: Counties and cities may have requirements specific to storing these chemicals. Also, storage and use of certain chemicals such as potassium permanganate and hydrogen peroxide may be subject to the new Chemical Facility Anti-Terrorism Standards of the Department of Homeland Security – the applicability depends on the chemical, quantity/concentration, and type of facility.

Please contact the project Environmental Manager to determine whether chemicals are subject to these standards.

- Injection chemicals must be stored in a designated, secured area with spill prevention capabilities. Review MSDS or other information to determine potential incompatible materials. Incompatible materials shall not be stored together. Ensure all containers are labeled.

8.3 Driving Safety

(Reference CH2M HILL HSE Policy 205, Distracted Driving – Wireless Devices, Vehicle Safety Core Standard)

All CH2M HILL employees are prohibited from using Wireless Devices while operating a Motor Vehicle when conducting company business regardless of the location or vehicle ownership and whether or not during regular working hours.

All CH2M HILL contractors and subcontractors are prohibited from using Wireless Devices while operating a CH2M HILL- or CH2M HILL client-owned, leased, or rented Motor Vehicle, or while operating any other Motor Vehicle on the project site.

- Prohibited use includes the following:
 - Dialing or speed dialing
 - Using a hands-free or voice recognition (blue tooth) device to dial or speed dial
 - Engaging in conversation or listening to a conversation using a Wireless Device
 - Checking emails or surfing the internet using a Wireless Device
 - Texting or e-mailing (reading, sending, or screening) with a Wireless Device
 - Programming or entering coordinates into a global positioning system (GPS) device (following directions by a GPS is permitted)
 - Using a Wireless Device for voice recording or dictation
- Employees, contractors, and subcontractors who need to use a wireless device must pull off the road to a safe location, with the vehicle securely stopped and emergency flashers on, or wait until they reach their destination.
- Avoid distractions from mobile phones, smartphones, voice recognition systems, PDAs, notebook, tablets (or similar devices), or laptops, by turning off or silencing the wireless devices before operating a motor vehicle.

Follow the guidelines below when operating a vehicle:

- Obey speed limits; be aware of blind spots or other hazards associated with low visibility. Practice defensive driving techniques, such as leaving plenty of room between your vehicle and the one ahead of you;
- Do no drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep;
- Maintain focus on driving. Eating, drinking, smoking, adjusting controls can divert attention from the road. Take the time to park and perform these tasks when parked rather than while driving; and
- Ensure vehicle drivers are familiar with the safe operation of vehicles of the type and size to be operated. Large vehicles such as full size vans and pick-ups have different vision challenges and handling characteristics than smaller vehicles.

8.4 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*– see Attachment 12)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed:

- Only qualified personnel are permitted to work on unprotected energized electrical systems;
- Only authorized personnel are permitted to enter high-voltage areas;
- CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office;
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented;
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service;
- CH2M HILL has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock;
 - GFCIs shall be used on all 120-volt, single phase 15 and 20-ampere receptacle outlets which are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
 - GFCIs cannot be utilized;
 - Client requires such a program to be implemented; or
 - Business group decides to implement program in addition to GFCI protection.
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire;
- Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory (UL) approved;
- Operate and maintain electric power tools and equipment according to manufacturers' instructions;
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet (3 meters) from overhead power lines for voltages of 50 kV or less, and 10 feet (3 meters) plus 0.4 inches (1.0 cm) for every 1 kV over 50 kV;
- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage; and
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

8.5 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles, or project vehicles.

- Maintain a first aid kit, bloodborne pathogen kit, and fire extinguisher in the field vehicle at all times.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.
- Familiarize yourself with rental vehicle features prior to operating the vehicle:
 - Vision Fields and Blind Spots
 - Vehicle Size
 - Mirror adjustments
 - Seat adjustments
 - Cruise control features, if offered
 - Pre-program radio stations and Global Positioning System (GPS), if equipped
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van or pick-up truck.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.
- Ensure back-up alarms are functioning, if equipped. Before backing a vehicle, take a walk around the vehicle to identify obstructions or hazards. Use a spotter when necessary to back into or out of an area.
- See the Vehicle Accident Guidance attached to this HSP, if a vehicle incident is experienced in a rental or fleet vehicle.

8.6 Fire Prevention

(Reference CH2M HILL SOP HSE-403, *Hazardous Material Handling*– see Attachment 12)

Follow the fire prevention and control procedures listed below.

8.6.1 Fire Extinguishers and General Fire Prevention Practices

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet (30.5 meters). When 5 gallons (19 liters) or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet (15.2 meters). Extinguishers must:
 - be maintained in a fully charged and operable condition;
 - be visually inspected each month; and
 - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet (3 meters) from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.

- Keep areas neat. Housekeeping is important.

8.6.2 Dispensing of Flammable/Combustible Liquids

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons (22.7 liters) (shall be separated from other operations by at least 25 feet (7.6 meters).
- Drainage away from storm drains or surface waters or other means of containment shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

8.7 General Practices and Housekeeping

The following are general requirements applicable to all portions of the work:

- Site work should be performed during daylight hours whenever possible;
- Good housekeeping must be maintained at all times in all project work areas;
- Common paths of travel should be established and kept free from the accumulation of materials;
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions;
- Provide slip-resistant surfaces, ropes, or other devices to be used;
- Specific areas should be designated for the proper storage of materials;
- Tools, equipment, materials, and supplies shall be stored in an orderly manner;
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area;
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals;
- All spills shall be quickly cleaned up; oil and grease shall be cleaned from walking and working surfaces;
- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others;
- Familiarize yourself with, understand, and follow jobsite emergency procedures;
- Do not fight or horseplay while conducting the firm's business;
- Do not use or possess firearms or other weapons while conducting the firm's business;
- Report unsafe conditions or unsafe acts to your supervisor immediately;
- Report emergencies, occupational illnesses, injuries, vehicle accidents, and near misses immediately;
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment;

- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor;
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion;
- Do not run in the workplace;
- When ascending or descending stairways, use the handrail and take one step at a time;
- Do not apply compressed air to any person or clothing;
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location;
- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery;
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations;
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible; and
- Check the work area to determine what problems or hazards may exist.

8.8 Hazard Communication

(Reference CH2M HILL SOPs HSE-107, *Hazard Communication* and HSE-403, *Hazardous Material Handling*— see Attachment 12)

The hazard communication coordinator is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using the chemical inventory form included as an attachment to this HSP;
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available;
- Request or confirm locations of material safety data sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed;
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical and include on the chemical inventory sheet (attached to this HSP) and add the MSDS to the MSDS attachment section of this HSP;
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly;
- Give employees required chemical-specific HAZCOM training using the chemical-specific training form included as an attachment to this HSP; and
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

8.9 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job;

- An approved Activity Hazard Analysis (AHA) or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training); and
- Knife users have been trained and follow the AHA.

8.10 Lighting

Lighting shall be evaluated when conducting work inside buildings, confined spaces, or other areas/instances where supplemental light may be needed (e.g., work before sunrise or after sunset). A light meter can be used to evaluate the adequacy of lighting. The following are common requirements for lighting and the conditions/type of work being performed:

- While work is in progress outside construction areas shall have at least 33 lux (lx);
- Construction work conducted inside buildings should be provided with at least 55 lux light;
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb will not leave any area in total darkness.

8.11 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*– see Attachment 12)

Back injuries are the leading cause of disabling work and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards;
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112;
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys;
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities;
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices; and
- All CH2M HILL workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the VO.

8.12 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work;
- Keep areas of broken skin (chapped, burned, etc.) covered; and
- Wash hands with soap and water prior to eating, smoking, or applying cosmetics.

8.13 Personal Security

Follow the guidelines below for personal security measures. The RHSM and Firm-Wide Security Office can be contacted if additional, specific measures are needed (e.g., such as evaluating the needs for security service).

General Safety and Security Guidelines

CH2M Hill Corporate Security Department recommends the following guidelines for workers in the United States:

- Stay alert and be aware of your surroundings. Avoid pre-occupations with mobile devices, while in an unfamiliar area.
- Whenever possible use the buddy system with another employee or client or subcontractor employee.
- Trust your intuition; if a situation appears strange or wrong, it probably is.
- Be confident in your walk or stride; do not give the appearance you are new in town.
- Avoid carrying and displaying large sums of cash.
- If you sense or see dangerous situations along your route, change your route and depart the area quickly. If you feel that you are being followed, go to the nearest police station or safe location and file a complaint with the police. Provide a description of the person, their vehicle, license plate number and any other useful information.
- Only walk short distances that are safe and secure while visiting an unfamiliar city or location.
- Take host approved transportation for long distances.
- "Fight or Flight?" Leaving the possible or dangerous area is always better than staying to fight.
- Always report suspicious activity to the nearest local law enforcement agency.
- Locate emergency exits in your hotel or where you are staying to ensure you know where to go in case of a fire or a natural or man-made disaster.
- Secure your electronic devices when left in your room or take them with you if you are not able to secure them properly.
- If you feel your life is in danger, call 911. Be sure to speak clearly, concisely and give the dispatcher a good description of where you are physically located.

Operating or Riding in Vehicles

- When waiting for public transportation or a taxi, remain in a store or restaurant as long as possible before catching your ride and never wait by yourself in an isolated area.
- Approach your vehicle with keys firmly in your hand and ready to unlock the car.
- Quickly check your car before entering it to determine damage or presence of an intruder.
- Vulnerable times can be stopping to find your keys to enter your vehicle or stepping out of your vehicle in an isolated area. Be aware of your surroundings before you perform these activities.
- Always keep your doors locked during transit and when the vehicle is parked.
- Never leave your vehicle unlocked, even when performing a quick task such as checking in a hotel, getting gas or going picking up food.

- If confronted by an individual inside a vehicle pointing a weapon at you, run the opposite way from where the vehicle is facing and scream as loud as you can. This evasive action will probably cause the individual to drive away.
- If an individual in a passing car points at your tires or engine to indicate a malfunction, only pull over in a well-lit and populated gas or rest stop. Never pull over in an isolated or dimly lit area. You may have a malfunction or the passing motorist may be attempting to rob you.
- Always park your vehicle in a well-lit and secure area. If your vehicle is parked in a dimly lit or isolated area in a parking garage; ask an attendant or friend to accompany you to your vehicle.
- Secure your valuables in the trunk, or place them out of sight or cover them with a blanket or coat if there is no secure storage area in the vehicle. The would-be-perpetrator likes to see what to steal and not knowing what you have concealed will normally prevent a break in.

Riding in a Taxi

- Have your host or a designated travel agent suggest or reserve a reputable taxi service for you during your stay.
- Only use a taxi service that was vetted for safety and reliability.
- If possible, place luggage, laptop and personal belongings inside the taxi.
- When you first enter the taxi, check the driver photo identification card, normally located on the driver's visor with the driver to ensure they match.

Walking

- If you experience automotive trouble, remain inside the locked vehicle and call for assistance.
- If you can't reach assistance via a mobile phone, only walk for help in a safe area facing the traffic.
- If while walking, you are shadowed or followed by a vehicle, run back in the direction of your vehicle and enter the vehicle if possible. File a police report on the incident as soon as practicable.
- Be aware of your surroundings and those around you while walking and do not be distracted by using electronic devices.
- Regularly change your route if you are walking to and from meetings or conferences and choose only well-lit areas to walk in at night.
- If walking long distances, identify a "safe house, shop, store or restaurant" to duck into if confronted by a perpetrator.

Jogging or Running

- Always jog or run in an area that is safe, secure, and used for exercising.
- Avoid running along busy roads or highways.
- If you chose to venture out on a jog or run, check the route by vehicle prior to beginning to exercise.
- Let the host or a friend know when you leave, when you plan to return, and the route you will take during exercising.
- Take a photo identification and mobile phone with you for emergencies.
- Avoid physically over-extending yourself since reflexes and decision-making ability can be impaired.

Clothing and Jewelry

- Dress to blend in with locals, maintain a low profile and avoid drawing attention to yourself.
- Travel with inexpensive clothing and jewelry.
- Avoid wearing CH2M HILL distinctive clothing or using CH2M HILL logos on luggage or laptops.

Emergency Numbers and Information

- Leave your itinerary and emergency contact numbers where you can be reached with family members and only those that have a need to know.
- Pre-program emergency numbers in the mobile device you are traveling with.
- Carry a list of current medications and specific doses in your purse or wallet.
- Record medical emergency information on a document that can be readily available if you are unable to speak or unconscious.
- Have a photo copy of your driver's license, passport, and credit card information separately in case your wallet or purse is stolen.

8.14 Shipping and Transportation of Hazardous Materials

(Reference CH2M HILL SOP HSE-417, *Hazardous Materials Transportation*– see Attachment 12)

The U.S. Department of Transportation (DOT) has specific regulations governing shipping of hazardous materials (also called dangerous goods). Chemicals brought to the site might be defined as hazardous materials by the U.S DOT. Hazardous wastes that may be shipped offsite are also defined as hazardous materials by U.S. DOT. Other wastes may also be U.S. DOT hazardous materials. To confirm whether a material or a waste is a U.S. DOT hazardous material, check with the ESG Waste Coordinator (Lisa Schwan/ATL), the project EM, or the CH2M HILL Dangerous Goods Shipping Coordinators (John Blasco/BAO or Rob Strehlow/MKW).

All staff who affect shipment of hazardous materials, including receiving hazardous materials, preparing profiles or manifests, packaging hazardous wastes, labeling, or transporting hazardous materials by road, are called HazMat employees (note CH2M HILL cannot transport hazardous wastes by public road). HazMat employees must receive CH2M HILL online training in shipping dangerous goods. CH2M HILL's online Dangerous Goods Shipping course can be found on the CH2M HILL HSSE website.

All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. If the material is a product that is being shipped (e.g., calibration gas), use the HazMat ShipRight tool on the CH2M HILL virtual office (under Company Resources – Online Shipping). Contact the Dangerous Goods Shipping coordinators, the ESG Waste Coordinator or the project EM for additional information.

49 CFR 172 requires that all hazmat employees be aware of potential transportation security concerns. Hazardous materials security is addressed in CH2M HILL's Hazardous Materials SOP (HSE-403, see Attachment 12). The following points are provided as an overview of security measures to increase awareness of this important matter:

- It is essential that each employee understand the security risks involved with transporting hazardous materials;
- All transporters of hazardous materials must be prequalified by a Contracts Administrator who evaluate the carrier's safety rating, security measures, and employee screening procedures;

- When shipping hazardous materials, check driver credentials and ask about shipping details;
- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver; and
- If there is suspicious or unusual behavior (e.g., driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the project manager or the RHSM.

Employees responsible for shipping hazard materials must also review the CH2M HILL Transportation Security Plan (HSE-417 Appendix A).

8.15 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace*– see Attachment 12)

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing CH2M HILL work;
- Abuse of prescription or nonprescription drugs;
- Use or possession of illegal drugs or drugs obtained illegally;
- Sale, purchase, or transfer of legal, illegal or illegally obtained drugs; and
- Arrival at work under the influence of legal or illegal drugs or alcohol.

Drug and/or alcohol testing is applicable under CH2M HILL Constructors, Inc. and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, this testing is performed in accordance with SOP HSE-105, *Drug-Free Workplace*. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the CH2M HILL Virtual Office (VO).

9.0 Project-Specific Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the work or the particular hazard. Each person onsite is required to abide by the hazard controls. Consult the appropriate CH2M HILL SOP to ensure all requirements are implemented. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

9.1 Chainsaws (Vegetation Clearance)

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools– see Attachment 12*)

Below are the hazard controls and safe work practices to follow when working around or operating chainsaws. Ensure the requirements in the referenced SOP are followed.

9.1.1 Equipment

Only chainsaws equipped with a spark arrestor and fully functioning chain brake or “safety chain” shall be used. The following safety equipment shall be readily available while operating a chainsaw:

- Chainsaw operator’s manual;
- Fully stocked first aid kit;
- Multipurpose fire extinguisher;
- Grounded extension cord approved for outdoor use and ground fault circuit interrupter (GFCI) for electrical-powered chainsaws;
- Approved safety gasoline container and funnel or flexible nozzle for refueling gasoline-powered chainsaws; and
- Sledge hammer and non-metallic wedges when necessary to prevent pinching of the chain.

9.1.2 PPE Requirements

The following personal protective equipment shall be worn while operating chainsaws:

- Safety glasses with side shields and face shield to prevent injury from wood chips, sawdust, or other flying objects;
- Hard hat with properly fitted suspension to prevent head injury from falling debris;
- Steel-toed safety shoes or boots to prevent foot injury from falling objects and accidental contact with the moving chain;
- Hearing protection to prevent permanent damage to hearing. Ear muffs or plugs will have a decibel noise reduction rating (NRR) assigned to them. The higher the rating, the greater the protection offered;
- Non-leather, fabric work gloves to prevent hand injury from abrasions, splinters and cuts;
- Clothing that is well-fitted and free of loose edges that could become entangled in the saw; and
- Protective chaps or leggings that cover the area from the groin to about 2 inches (5.08 cm) above the ankles should be used. These chaps are made from synthetic fabrics that are designed to prevent the running saw chain from coming in contact with your legs.

9.1.3 Safe Operation

The following safe operation guidelines shall be followed regardless of the purpose for using a chainsaw:

- Inspect the chainsaw prior to use;
- Chainsaws shall be held firmly with both hands, with thumbs and fingers encircling both chain saw handles;
- Stand slightly to the left side of the saw, out of the plane of the cutting chain and guide bar to reduce the risk of injury in the event of a kickback;
- Position saw so that it is between the waist and mid-chest level. Overreaching or cutting above the mid-chest height shall be avoided;
- Maintain a full throttle setting while cutting. Chainsaws are designed to be run at full speed;
- Always be aware of what is in the saw's downward path after the cut;
- Do not attempt to cut material that is larger than the guide bar of the saw;
- Avoid cuts that will cause the chainsaw to jam. Always cut into the compression wood first until the cut starts to close; then cut from the other side toward the compression cut;
- Use a non-metallic wedge to prevent the compression cut jamming on the blade;
- Chainsaws are designed to feed themselves into the wood and require only light pressure to cut efficiently. If extra force is required to keep cutting, the chain requires sharpening. Additional signs of a dull chain include a saw that is cutting crooked, results in fine sawdust instead of chips, or the smell of burnt wood. Do not use a dull chain;
- Bystanders and helpers shall be kept at a safe distance from operation;
- Do not operate a chainsaw when fatigued; take frequent breaks;
- Work slowly; don't rush; and
- A fire extinguisher shall be present at all times when operating the chainsaw in forest or brushy areas.

9.1.4 Refueling the Engine

The fuel for gasoline-powered chainsaws shall be mixed in accordance with the manufacturer's recommendations as outlined in the chainsaw operator's manual. Fuel shall be stored and transported in an approved safety container. The following precautions should also be followed:

- The engine shall be shut off and allowed to cool before refueling; never refuel a hot engine;
- A fire extinguisher shall be present during fueling and refueling;
- Smoking around fueling or refueling operations shall be prohibited; and
- A funnel or a flexible nozzle shall be used to avoid spilling fuel on the engine.

9.2 Temporary Road Construction/Earth Moving Equipment

Below are the hazard controls and safe work practices to follow when working around or operating heavy equipment. Ensure the requirements in the referenced SOP are followed.

- CH2M HILL authorizes only those employees qualified by training or previous experience to operate material handling equipment.
- CH2M HILL employees must be evaluated prior to operating earthmoving equipment by a CH2M HILL earthmoving equipment operator evaluation designated person. This evaluation will be documented according to SOP HSE-306, Earthmoving Equipment (see Attachment 12).
- Heavy equipment operators are prohibited from using any wireless device while operating equipment. Equipment must be stopped before using devices such as two way radios or cell phones.
- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include: service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts and operating controls. All defects shall be corrected before the equipment is placed in service. Documentation of this inspection must be maintained onsite at all times (use the Earthmoving Equipment Inspection form if operated by CH2M HILL).
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls shall be in a neutral position, with the motors stopped and brakes set.
- Equipment which is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operators view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 feet (3 meters) from the power lines less than 50 kilovolts (kV). Provide an additional 4 feet (1.2 meters) for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered to be an energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- Underground utility lines must be located before excavation begins; refer to the Utilities (underground) section.
- Operators loading and unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake shall be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When not in operation, the blade or bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades or buckets landed and shift lever in neutral.

9.3 Drilling Safety

(Reference CH2M HILL SOP HSE-204, *Drilling*– see Attachment 12)

Below are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. Maintain a minimum distance of 10 feet (3 meters) between mast and overhead lines (<50 kV) and an additional 0.4 inches for every 1 kV over 50kV. Verify the voltage of nearby overhead power lines to determine the minimum distance.
- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 (see Attachment 12) shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.
- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this HSP to evaluate drilling operations.

9.4 Excavation Activities

(Reference CH2M HILL SOP HSE-307, *Excavation and Trenching Safety*– see Attachment 12)

The requirements in this section shall be followed whenever excavation is being performed. Refer to the Earthmoving Equipment section and SOP for additional requirements applicable to operating/oversight of earthmoving equipment. Below are the hazard controls and safe work practices to follow when working around or performing excavation. Ensure the requirements in the referenced SOP are followed.

- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 (see Attachment 12) shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) ORE (Opportunity Risk Evaluation).
- Do not enter the excavations unless completely necessary, and only after the excavation competent person has completed their daily inspection and has authorized entry. An inspection shall be conducted by the competent person prior to the start of work, as needed throughout the shift, after every rainstorm, and after any hazard increasing occurrence. Documentation of the inspection must be maintained onsite at all times.
- Follow all excavation entry requirements established by the excavation competent person and any excavation permit being used.
- Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet deep (1.5 meters) and there is no indication of possible cave-in, as determined by the excavation competent person. Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.
- Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).
- The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.
- Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.
- Excavations shall not be entered when:
 - Protective systems are damaged or unstable;
 - Objects or structures above the work location may become unstable and fall into the excavation;
 - The potential for a hazardous atmosphere exists, unless the air has been tested and found to be at safe levels; or
 - Accumulated water exists in the excavation, unless precautions have been taken to prevent excavation cave-in.

- The excavation self-assessment checklist shall be used to evaluate excavations prior to entry.

9.5 Groundwater & Soil Sampling

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are performing groundwater sampling and/or water level measurements.

- Full coolers are heavy. Plan in advance to have two people available at the end of the sampling effort to load full coolers into vehicles. If two people won't be available use several smaller coolers instead of fewer large ones.
- Wear the appropriate PPE when sampling, including safety glasses, nitrile gloves, and steel toe boots (see PPE section of this HSP).
- Monitor headspace of wells prior to sampling to minimize any vapor inhalation (refer to the "Site Monitoring" section of this HSP).
- Use caution when opening well lids. Wells may contain poisonous spiders and hornet or wasp nests.
- Use the appropriate lifting procedures (see CH2M HILL SOP HSE-112, Attachment 12) when unloading equipment and sampling at each well.
- Avoid sharp edges on well casings.
- If dermal contact occurs with groundwater or the acid used in sample preservation, immediately wash all affected skin thoroughly with soap and water.
- Avoid eating and drinking on site and during sampling.
- Use ear plugs during sampling if sampling involves a generator.
- Containerize all purge water and transport to the appropriate storage area.
- Use two people to transport full coolers/containers whenever possible. If two people are not available use a dolly to move coolers. If the coolers weigh more than 40 pounds Attachment 1 of the HSE-112, *Manual Lifting*, shall be completed by the SC. If the coolers weigh more than 50 pounds they should never be lifted by one person.

9.6 Benzene

(Reference CH2M HILL SOP HSE-503, *Benzene*– see Attachment 12)

Benzene is considered a "Confirmed Human Carcinogen." CH2M HILL is required to control employee workplace exposure to benzene when personal exposures is at or above 0.5 parts per million (ppm) as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the OSHA Benzene standard, 29 CFR 1910.1028. The elements of the CH2M HILL benzene program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment (PPE) and respirators;
- Medical surveillance;
- Training on hazards of benzene and control measures (includes project-specific training and the computer-based training on CH2M HILL's Virtual Office, *Benzene*); and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this HSP.

9.7 Cadmium

(Reference CH2M HILL SOP HSE-504, *Cadmium*– see Attachment 12)

Cadmium is considered a “Suspected Human Carcinogen.” CH2M HILL is required to control employee workplace exposure to cadmium when personal exposure is at or above 2.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) by implementing a program that meets the requirements of the OSHA Cadmium standard, 29 *Code of Federal Regulations* (CFR) 1926.1127. The elements of the CH2M HILL cadmium program include the following:

- Exposure monitoring;
- Methods of control, including PPE and respirators;
- Medical surveillance;
- Training on hazards of cadmium and control measures (includes project-specific training and the computer-based training on CH2M HILL’s Virtual Office, *Cadmium*); and
- Recordkeeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this HSP.

9.8 Compressed Gas Cylinders

(Reference CH2M HILL SOP HSE-403, *Hazardous Materials Handling*– see Attachment 12)

Below are the hazard controls and safe work practices to follow when working around or using compressed gas cylinders. Ensure the requirements in the referenced SOP are followed.

- Cylinders and pressure-controlling apparatus shall be inspected for defects and leakage prior to use. Damaged or defective items shall not be used. If a cylinder is found to be defective, the gas distributor shall be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.
- Cylinders shall be labeled with the identity of the contents. Cylinders not labeled shall be sent back to the cylinder distributor. The color of the cylinder shall not be used exclusively to identify cylinder contents.

- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinders must be secured in an upright position at all times.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.
- Eye protection (safety glasses or goggles) shall be worn when using cylinders.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders inside buildings shall be stored in dry, well-ventilated locations at least 20 feet (6.1 meters) from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas shall be located where cylinders will not be knocked over or damaged.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour.
- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinders.
- Complete the self-assessment checklist for compressed gas cylinders are being used.

9.9 Drum Handling

Below are the hazard controls and safe work practices to follow when overseeing the movement of drums or when handling drums.

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries.
- Ensure drum bungs/lids are secured and drums are labeled prior to moving.
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.
- Ensure there are appropriately designed Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials.
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency.
- Supply operators with appropriate respiratory protective equipment when needed.
- Ensure that drums are secure and are not in the operator's view of the roadway.
- Prior to handling, all personnel should be warned about hazards of handling.
- Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved (e.g. small containers may have to be removed first to permit heavy equipment to enter and move the drums).

- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur.

9.10 Drum Sampling Safety

Personnel are permitted to handle and/or sample drums containing certain types of waste (drilling waste, investigation-derived waste, waste from known sources) only. Handling or sampling drums with unknown contents requires a plan revision or amendment approved by the RHSM. The following control measures will be taken when sampling drums:

- Minimize transportation of drums.
- Sample only labeled drums or drums from a known waste stream.
- Do not sample bulging or swollen drums. Contact the RHSM.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Use the proper tools to open and seal drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer/sample the content of drums using a method that minimizes contact with material.
- Use the PPE and perform air monitoring as specified in the PPE and Site Monitoring sections of this HSP.
- Have a spill kit accessible during sampling activities.
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

9.11 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*– see Attachment 12)

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are using hand and power tools. Ensure the requirements in the referenced SOP are followed.

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand and power tools in a safe condition.
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool.
- Do not carry or lower a power tool by its cord or hose.
- Portable power tools will be plugged into GFCI protected outlets; and
- Portable power tools will be Underwriters Laboratories (UL) listed and have a three-wire grounded plug or be double insulated.
- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).

- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

9.12 Hexavalent Chromium (Cr VI) Exposure

(Reference the CH2M HILL SOP HSE-513, *Hexavalent Chromium - Chromium VI*– see Attachment 12)

The OSHA permissible exposure limit (PEL) and ACGIH Threshold Limit Value (TLV) for Chromium VI is 5 ug/m³ (insoluble) and 1 ug/m³ (soluble) with an action level (AL) of 2.5 ug/m³ for insoluble and 0.5 ug/m³ for soluble. Hexavalent Chromium is considered a Human Carcinogen.

The precautions listed below shall be followed when exposed to Cr VI:

- Exposure assessments must be performed for workers who may be exposed to Cr VI above the AL.
- Avoid exposure by inhalation, skin and eye contact with fume, liquid and/or particulate Cr VI.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.
- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Review the fact sheet included as an attachment to this HSP.

9.13 Lead

(Reference CH2M HILL SOP HSE-508, *Lead*– see Attachment 12)

CH2M HILL is required to control employee exposure to lead when exposures are at or above 30 µg/m³ by implementing a program that meets the requirements of the OSHA Lead standard, 29 CFR 1910.1025 and 29 CFR 1926.62. The elements of the CH2M HILL lead program include the following:

- Exposure monitoring;
- Methods of control, including personal protective equipment (PPE) and respirators;
- Medical surveillance;
- Training on hazards of lead and control measures (includes project-specific training and the computer-based training on CH2M HILL's Virtual Office, *Lead Exposure Training*); and
- Record keeping requirements.

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met;
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas;
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person; and
- Review the fact sheet included as an attachment to this HSP.

9.14 Lockout/Tagout Activities

(Reference CH2M HILL SOP HSE-310, *Lockout and Tagout*– see Attachment 12)

Lockout/tagout (LO/TO) shall be performed whenever service or maintenance is necessary on equipment that could cause injury to personnel from the unexpected equipment energizing or start-up or unexpected release of stored energy. Energy sources requiring lockout/tagout may include electrical, pneumatic, kinetic, and potential.

If work on energized electrical systems is necessary – contact the RHSM. Specific training and procedures are required to be followed before any work on energized electrical systems can be performed and are NOT covered in this section. Energized electrical work is defined as work performed **on or near** energized electrical systems or equipment with exposed components operating at 50 volts or greater. Working near energized live parts is any activity inside a Limited Approach Boundary (anywhere from 3.5 feet to 24 feet [1 meter 7.3 meters] depending on voltage). Examples of energized electrical work include using a voltmeter to troubleshoot electrical systems and changing out controllers.

When lockout/tagout is necessary to perform maintenance/repair of a system, all the requirements of SOP HSE-310, *Lockout and Tagout* (see Attachment 12), shall be met including the following bulleted items:

- When CH2M HILL controls the work, CH2M HILL must verify that subcontractors affected by the unexpected operation of equipment develop a written lockout/tagout program, provide training on lockout/tagout procedures and coordinate its program with other affected subcontractors. This may include compliance with the owner or facility lockout/tagout program.
- When CH2M HILL personnel are affected by the unexpected operation of equipment they must complete the electrical safety awareness module on the VO. Authorized personnel shall inform the affected personnel of the LO/TO. Affected personnel shall not tamper with LO/TO devices.
- Standard lockout/tagout procedures include the following six steps: 1) notify all personnel in the affected area of the lockout/tagout, 2) shut down the equipment using normal operating controls, 3) isolate all energy sources, 4) apply individual lock and tag to each energy isolating device, 5) relieve or restrain all potentially hazardous stored or residual energy, and 6) verify that isolation

and deenergization of the equipment has been accomplished. Once verified that the equipment is at the zero energy state, work may begin.

- All safe guards must be put back in place, all affected personnel notified that lockout has been removed and controls positioned in the safe mode prior to lockout removal. Only the individual who applied the lock and tag may remove them.
- CH2M HILL authorized employees shall complete the LO/TO training module on the VO and either the electrical safety training module on the VO or 10-hour construction training. The authorized employee must also be trained and qualified on the system they are working on (e.g., qualified electrician for working on electrical components of a system).
- When equipment-specific LO/TO procedures are not available or when existing procedures are determined to be insufficient, CH2M HILL authorized employees shall also complete the Equipment-Specific LO/TO Procedure Development Form, provided as an attachment to this HSP, to create an equipment-specific lockout/tagout procedure.

9.15 Portable Generator Hazards

(Reference CH2M HILL SOP HSE-206, Electrical Safety– *see Attachment 12*)

- Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide (CO) poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.
- NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide (CO) very quickly. When you use a portable generator, remember that you cannot smell or see CO. Even if you can't smell exhaust fumes, you may still be exposed to CO.
- If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The CO from generators can rapidly lead to full incapacitation and death.
- If you experience serious symptoms, get medical attention immediately. Inform project staff that CO poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.
- Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow CO to come indoors.
- Ensure the generator is grounded in accordance with the manufacturer's operation manual.
- Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.
- Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.
- Most generators come with Ground Fault Circuit Interrupters (GFCI). Test the GFCIs daily to determine whether they are working
- If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.
- Never store fuel near the generator or near any sources of ignition.
- Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

9.16 Pressure Washing Operations

Below are the hazard controls and safe work practices to follow when working around or performing pressure washing.

- Only trained, authorized personnel may operate the high-pressure washer.
- Follow manufacturer's safety and operating instructions.
- Inspect pressure washer before use and confirm deadman trigger is fully operational
- The wand must always be pointed at the work area.
- The trigger should never be tied down
- Never point the wand at yourself or another worker.
- The wand must be at least 42 inches (1.1 meter) from the trigger to the tip and utilize greater than 10 degree tips.
- The operator must maintain good footing.
- Non-operators must remain a safe distance from the operator.
- No unauthorized attachment may be made to the unit.
- Do not modify the wand.
- All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- Polycoated Tyvek or equivalent, 16-inch-high steel-toed rubber boots, safety glasses, hard hat with face shield, and inner and outer nitrile gloves will be worn, at a minimum.

9.17 Slips, Trips and Falls

General

- Institute and maintain good housekeeping practices.
- Designate foot traffic paths in and out of sites, when necessary, to ensure paths are kept free from slip, trip, and fall hazards or to deter personnel from taking "shortcuts" where slip, trip, hazards may be.
- Mitigate icy conditions by keeping foot traffic paths clear of ice and snow.
- Watch footing as you walk to avoid trip hazards, animal holes, or other obstacles, especially in tall grassy areas.

Muddy Conditions

- Muddy conditions present a slipping hazard. Use mats or other similar surface to work from if footing cannot be stabilized.
- Take shortened steps across muddy areas.
- Use a walking staff or other similar means to assist with balance.

Steep Slopes/Uneven Ground/Rock and Vertical Slopes

- Be aware that escarpments can slough. Avoid these areas.
- Exercise caution in relying on rocks and trees/tree stumps to support yourself – many times they are loose.

- Whenever possible, switchback your way up/down steep areas, and maintain a slow pace with firm footing.
- Employees walking in ditches, swales and other drainage structures adjacent to roads or across undeveloped land must use caution to prevent slips and falls which can result in twisted or sprained ankles, knees, and backs.
- Whenever possible observe the conditions from a flat surface and do not enter a steep ditch or side of a steep road bed.
- If steep terrain must be negotiated coordinate with RHSM to evaluate the need for ladders or ropes to provide stability.

9.18 Traffic Control

(Reference CH2M HILL SOP HSE-216, *Traffic Control*– see Attachment 12)

The following precautions must be taken when working around traffic, and in or near an area where traffic controls have been established by a sub contractor. Ensure the requirements in the referenced SOP are followed.

- Exercise caution when exiting traveled way or parking along street – avoid sudden stops, use flashers, etc.
- Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.
- All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.
- Eye protection should be worn to protect from flying debris.
- Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Always remain aware of an escape route (e.g., behind an established barrier, parked vehicle, guardrail, etc).
- Always pay attention to moving traffic – never assume drivers are looking out for you.
- Work as far from traveled way as possible to avoid creating confusion for drivers.
- When workers must face away from traffic, a “buddy system” should be used, where one worker is looking towards traffic.
- When working on highway projects, obtain a copy of the contractor’s traffic control plan.
- Work area should be protected by a physical barrier – such as a K-rail or Jersey barrier.
- Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.
- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet (12.2 meters) of traffic should have an orange flashing hazard light atop the vehicle.

- Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers.
- Vehicles should be parked at least 40 feet (12.2 meters) away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.
- Traffic control training module on the VO shall be completed when CH2M HILL workers who work in and around roadways and who exposed to public vehicular traffic.

9.19 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact underground utilities or similar subsurface obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand augering, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include at least the following elements:

1. A background and records assessment of known utilities or other subsurface obstructions.
2. Contacting and using the designated local utility locating service.
3. Conducting an independent field survey to identify, locate, and mark potential underground utilities or subsurface obstructions. *Note: This is independent of, and in addition to, any utility survey conducted by the designated local utility locating service above.*
4. A visual survey of the area to validate the chosen location.

When any of these steps identifies an underground utility within 5 feet (1.5 meters) of intrusive work, then non-aggressive means must be used to physically locate the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified high risk utility (see paragraph below).

Any deviation from these requirements must be approved by the Responsible HS Manager and the Project Manager.

Background and Records Assessment of Known Utilities

Identify any client- or location-specific permit and/or procedural requirements (e.g., dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility.

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical lines, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. *Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.*

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

Designated Local Utility Locating Service

Contact your designated local utility locating service (e.g., Dig-Safe, Blue Stake, One Call) to identify and mark the location of utilities. Call 811 in the US or go to www.call811.com to identify the appropriate local service group. Contacting the local utility locating service is a legal requirement in most jurisdictions. [NJ-1-Call: 800.272.1000, <http://www.nj1-call.org/> with internet ticket filing]

Visual Assessment before and during Intrusive Activities

Perform a “360 degree” assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area.

The visual survey shall include all surface landmarks, including manholes, previous linear pavement cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

If any unanticipated items are found, conduct further research before initiating intrusive activities and implement any actions needed to avoid striking the utility or obstruction.

Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility or when there is uncertainty about utility locations, locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

Intrusive Activities within 2 feet of an Underground Utility

Use non-aggressive methods (hand digging, vacuum excavation, etc.) to perform intrusive activities within 2 feet of a high risk utility (i.e., a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

Spotter

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered stop work immediately and contact the PM or RHSM to evaluate the situation. The spotter must have a method to alert an operator to stop the intrusive activity (e.g., air horn, hand signals).

9.20 Utilities (overhead)

Proximity to Power Lines

No work is to be conducted within 50 feet (15.2 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15.2 meters) of overhead power lines without first making this determination.

Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:

- Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the table.

MINIMUM DISTANCES FROM POWERLINES

Powerlines Nominal System Kv	Minimum Required Distance, Feet (Meters)
0-50	10 (3.0)
51-100	12 (3.7)
101-200	15 (4.6)
201-300	20 (6.1)
301-500	25 (7.6)
501-750	35 (10.7)
751-1000	45 (13.7)

(These distances have been determined to eliminate the potential for arcing based on the line voltage.)

- The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.
- All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

9.21 Vinyl Chloride

(Reference CH2M HILL, SOP HSE-512, *Vinyl Chloride*– see Attachment 12)

Vinyl Chloride is considered a "Confirmed Human Carcinogen." Vinyl Chloride has a mild, sweet, chloroform-like odor.

CH2M HILL is required to control employee workplace exposure to vinyl chloride when personal exposures are at or above 1.0 ppm as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the Occupational Safety and Health Administration (OSHA) Vinyl Chloride standard, 29 CFR 1910.1017. The elements of the CH2M HILL vinyl chloride program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of vinyl chloride and control measures (includes project-specific training and the computer-based training on CH2M HILL's Virtual Office, *Vinyl Chloride*)
- Record keeping requirements

If air monitoring indicates there is potential exposure at the action level concentrations above, notify the RHSM to ensure the above have been adequately addressed. Other exposure control measures include:

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.

- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Respiratory protection and other exposure controls selection shall be based on the most recent exposure monitoring results obtained from the competent person.
- Review the fact sheet included as an attachment to this HSP.

9.22 Working Around Material Handling Equipment

When CH2M HILL personnel are exposed to material handling equipment, the following safe work practices/hazard controls shall be implemented:

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Never turn your back on any operating equipment.
- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers and equipped with firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.
- Wear a high visibility safety vest or high visibility clothing

9.23 Working Alone

(Reference CH2M HILL Core Standard, *Working Alone*)

Personnel can only be tasked to work alone by the Project Manager who shall assess potential hazards and appropriate control measures, with assistance from the Responsible Health and Safety Manager (RHSM).

“Lone workers” with an accountability system in place is permitted, depending on the hazards presented during the execution of the task. Reference the “Lone Worker Protocol” included as an attachment to this HSP.

Only limited operations task are permitted to be performed alone. Activities that are not permitted to be performed by a lone worker include the following:

- Working at heights (e.g., on ladders, lifts, scaffolding);
- Energy isolation (e.g., lockout/tagout);
- Any entry into a confined space; and
- Work involving electricity or other hazardous equipment (e.g., chainsaws);
- Work over or near water; and
- Working in an area where there is an increased potential for violence.

An AHA shall be developed that shall include:

- Type or nature of work to be conducted by the lone worker;
- Location of the work
- Length of time the worker will be working alone; and
- Any characteristics of the individual working alone which may increase the risk to the worker (e.g., medical conditions).

The employee working alone shall at all times be equipped with a working voice communication device such as a cellular phone, satellite phone, personal alarms, or two-way radio to check-in to their project contact (s) at pre-determined times. For some work, a satellite-based communication system may be appropriate (i.e., a "SPOT" device).

Call-In System for Lone Worker Accountability

Call in contact name:	• Lone workers are not expected. If utilized, call Andy Judd
Phone numbers (office and cell):	• NJO: 973-316-3523, Cell: 973-769-1473, Home: 908-955-7155

The employee working alone shall at all times be equipped with a working voice communication device such as a cellular phone, satellite phone, personal alarms, or two-way radio to check-in to their project contact (s) at pre-determined times.

Each time before going into the field, the "Call in contact Form" attached to this HSP shall be completed by the lone worker and given to the call-in office worker contact prior to going into the field.

During field work, a copy of "The Lone Worker Call-In Contact Form" should be maintained by both the "Office Contact Worker" and the field-worker ("Lone Worker"). Lone Worker and Office Contact Worker must both have cell phones and each others' phone number, plus one other alternate phone number.

Lone worker shall call the office contact worker when he/she has arrived on-site, before exiting his/her vehicle. On this phone call, a time shall be arranged for a "check-in" call to be made by the field worker, based on duration of task. On each "check-in" call a time should be arranged for the next "check-in" call. Document these times on the form.

Lone Worker shall carry his or her cell-phone throughout the field event and put the ringer on its loudest setting as wind or other noise can muffle the sound. If, for any reason the cell-phone becomes inoperable, the field-worker shall immediately stop work, leave the site and find an alternative method of contacting the Office Contact Worker to verify their safety and to inform them of the issue.

Work shall not proceed in the field until the Lone Worker has a working device that provides communication with the Office Contact Worker.

Upon completion of work activities, Lone Worker should pack up all materials and prepare to leave site. Then, before starting the engine of the vehicle to leave site, the Lone Worker should contact the office-worker and inform him or her that work is complete and that he or she is leaving the site. A final call shall be made by the lone work to the office worker to confirm he/she has reached their destination.

If at any time, the Office Contact Worker does not receive a "check-in" call at the scheduled time he/she should attempt to contact Lone Worker. If no contact is made then the Office Contact Worker should contact the facility contact person to check on the Lone Worker.

If no contact is made with the Lone Worker, then the Office Contact Worker shall contact the PM and/or RHSM to let them know they are going to inform emergency services inform that there is a possible

emergency and instruct them to go to the field location and assist the Lone Worker. The Office Contact Worker will provide to emergency services the Lone Worker's name, their last known location, vehicle description and their contact information.

Call in contact Form shall be completed by lone worker and given to call in contact prior to going into the field. Refer to the "Lone Worker Protocol" attached to this HSP.

9.24 Stream Crossing

Traversing streams present significant hazards, including drowning, hypothermia, and abrasions. When crossing streams, be sure to implement the bulleted items below.

- When walking in streams, first plan the route. Look ahead for exits should there be any difficulty during the crossing, and "read" the water for spots to avoid such as drop offs, sunken logs, and tricky currents.
- Do seek out the safest route – narrow, low flow, shallow. Evaluate deeper and faster moving sections with caution. Backtracking is often dangerous or impossible once committed.
- If streams to be crossed are deeper than "knee deep", find an alternate crossing location that is less deep.
- Streams should be crossed while facing upstream, stepping side to side, and using a sturdy walking stick. When possible, wade a stream diagonally, moving downstream. Move slowly, keeping the foot on the upstream side in the lead and pointed forward. Your rear, or anchor, foot should point downstream and be at right angles to the lead foot. Move the lead foot forward about half a step, feeling for a solid hold. Next, move the anchor foot forward the same distance – shuffle across so that your anchor foot never passes the lead. This way both feet are always in position to lend support. If you must turn around, do so toward the upstream direction.
- Don't attempt to cross above rocky rapids or a cascade. Step on submersed rocks with great care.
- If you are working in streams, algae covered rocks should be assumed slippery until tested. Always be alert for unstable and extremely slippery rocks.
- Rocks with green moss or attached plants offer better traction or even better, look for gravel and sand pockets among the stream boulders, which are much more stable, and use a wading staff (if not carrying one, find a suitable one nearby) to steady your balance while crossing. Use a solid wading staff instead of the collapsible type.
- Be cautious of areas where there are submerged or partially submerged trees/tree branches – these can create entanglement hazards during a crossing or a "swim".
- Footwear with felt-bottom soles are ideal for rocky bottom streams. The rough texture cuts through algae growing on the rocks and grips well. For very slippery conditions, consider studded felt soles or a slipover, studded sandal. However, felt soles do not provide good traction on muddy, slippery banks. Cleated soles work well for mud or sand bottom streams (a hard molded tread pattern similar to a hiking boot).
- The higher the elevation you are at, the steeper the stream gradient is. This means the stream can rise quicker and return to lower flow more quickly.
- Always wait out a swollen stream if at all possible.

- If you do slip into the water and are being swept downstream, don't panic. Cold water will be a shock for 2-3 seconds. Pull your knees up, face your feet downstream and lean back, using your hands as best you can to navigate and get to the bank. Keep your head up; you don't want your head underwater banging into rocks. If you stay calm, you can reach water where you can stand up or swim to the bank.
- When walking along stream banks and not entering streams, wear work boots.

10.0 Physical Hazards and Controls

10.1 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*– see Attachment 12)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels, A-weighted, (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

- Areas or equipment emitting noise at or above 90dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 84 dBA or a noise dose of 50% must participate in the Hearing Conservation program including initial and annual (as required) audiograms.
- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.
- Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's virtual office.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner.

10.2 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.

- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion" style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

10.3 Temperature Extremes

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress;
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes (see following sections); and
- Communicating any concerns regarding heat and cold stress to their supervisor or SC.

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the lower the body temperature (indicates less retrained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least two continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss

begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in three to four weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level; such as during a heat wave.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

SYMPTOMS AND TREATMENT OF HEAT STRESS					
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool—but not cold—water. Call ambulance, and get medical attention immediately!

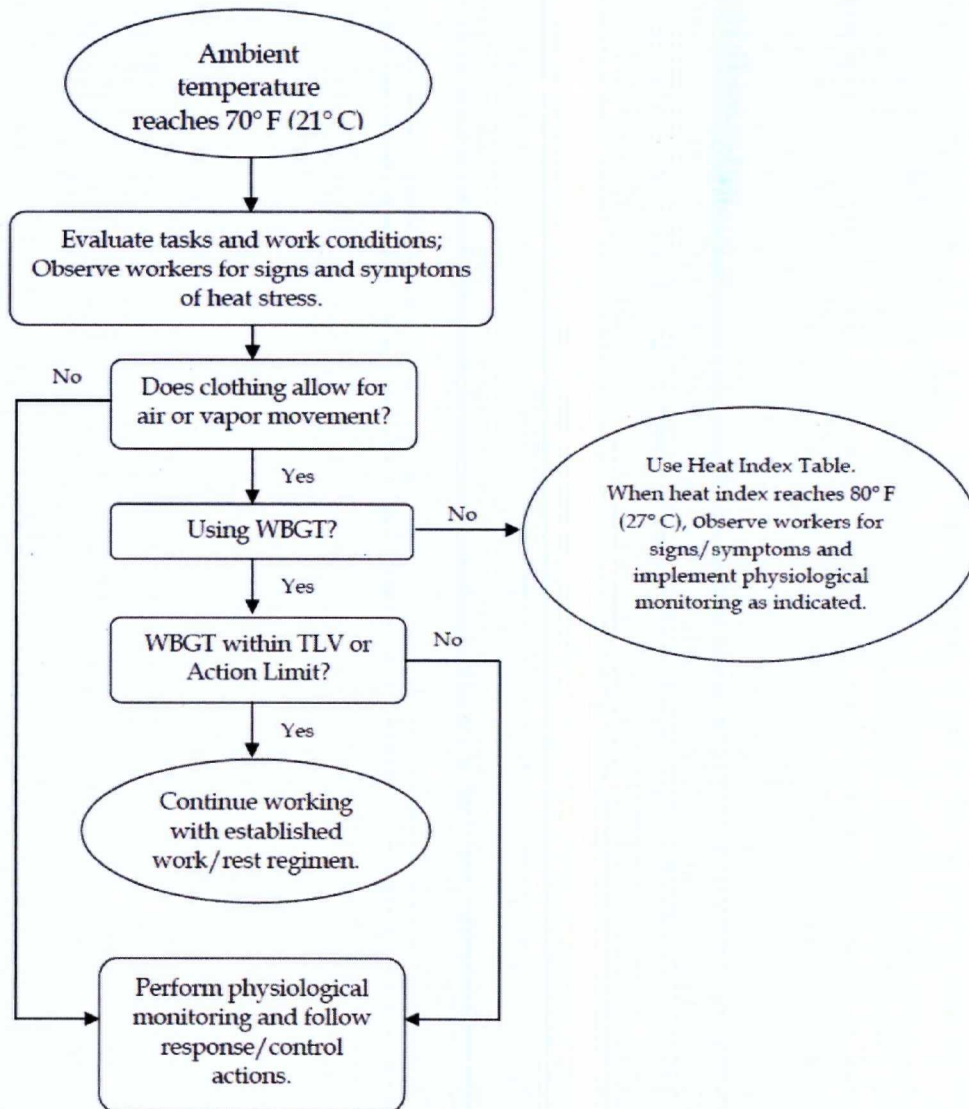
Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°Fahrenheit (10 degrees Celsius [C]) to 60°Fahrenheit (F) (15.6 degrees C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Remind employees to drink water throughout their work shift.
- Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate to site work conditions by slowly increasing workloads; for example, do not begin site work with extremely demanding activities. Closely monitor employees during their first 14 days of work in the field.
- Supervisors and SCs must continually observe employees throughout the work shift for signs and symptoms of heat stress or illness. Employees must monitor themselves for heat stress as well as observe their co-workers.
- Effective communication must be maintained with employees throughout the work shift either by voice, observation, or electronic device.

- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Use portable fans for convection cooling or in extreme heat conditions, an air-conditioned rest area when needed.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.
- Brief employees initially before the project work begins and routinely as part of the daily safety briefing, on the signs and symptoms, of heat-relatedness illnesses, precautions to measures and emergency procedures to follow as described in this plan.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

Thermal Stress Monitoring

Thermal Stress Monitoring Flow Chart



Heat Index Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 Extreme Danger

Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline and observe workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline, then at least every hour, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Conduct initial monitoring as baseline, then every 30 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Conduct initial monitoring as baseline, then every 15 minutes or sooner if signs of heat stress are observed.

Source: National Weather Service

Physiological Monitoring and Associated Actions

For employees wearing permeable clothing, follow the minimum frequency of physiological monitoring listed in the Heat Index Table.

For employees wearing impermeable clothing, physiological monitoring should begin initially at a 15 minute interval, then if the employee's heart rate or body temperature is within acceptable limits, conduct the subsequent physiological monitoring at 30 minutes, and follow the established regimen protocol below.

When physiological monitoring is required, use either radial pulse or aural temperature and follow actions below:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (e.g. 180 - 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 beats per minute (bpm).
- If the heart rate is higher than 120 bpm after the FIRST minute into the rest period, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm after the FIRST minute into the rest period.

Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.

- If the oral or aural temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6 ° F (37.6° C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken.

Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

10.3.1 Cold

General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but not hot—water. Have victim drink warm fluids, but not coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but not coffee or alcohol. Get medical attention.



Wind Chill Chart



		Temperature (°F)																		
		Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Wind (mph)	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63	-69
	10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72	-78
	15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77	-83
	20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81	-87
	25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84	-90
	30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87	-93
	35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89	-95
	40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91	-97
	45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93	-99
	50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95	-101
	55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-96	-102
	60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98	-104

Frostbite Times 30 minutes 10 minutes 5 minutes

Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})
Where, T= Air Temperature (°F) V= Wind Speed (mph) Effective 11/01/01

10.4 Radiological Hazards

Refer to CH2M HILL's Core Standard, Radiological Control and Radiological Controls Manual for additional requirements.

Identification

Prior to excavation, a scan for low level radiation hazards (LLRH) will be conducted by a qualified technician. If the area presents a radioactive hazard, it will be left in place, flagged, and documented and the Responsible Health and Safety Manager/Radiation Safety Manager will be notified.

All initial scans (prior to handling anything) will be conducted utilizing a Ludlum 3 pancake meter. See Hazards/Controls below.

Upon discovery of LLRH, site controls and hygiene protocols will be re-evaluated.

Management and Disposition of Radioactive Hazard detected during Excavation

If any articles are found during the investigation activities that contain greater readings than the 3 times the background, the following procedures will be followed.

Hazards	Controls
Potential for non-native radiological materials to be in site soils and/or materials such as mottled multi-colored clay-like material, black sludge, etc.	<p>A radiation monitoring unit (Ludlum 3 equipped with a pancake meter, or equivalent) that can measure alpha, beta, and gamma particles will be used during test pit excavation activities.</p> <p>Excavated soil will be removed in 'lifts' and spread in the stockpile area to facilitate scanning with the radiation monitor to detect radiation being emitted from the soil.</p> <p>If radiation from soil is measured at levels 3 times greater than background radiation (the radiation level from an undisturbed portion of the site) then work activities at that test pit will cease and the test pit will be barricaded to establish an exclusion zone around its perimeter and the excavator bucket will be temporarily taken out of service until further direction is received.</p> <p>The H&S manager and other pertinent staff will be notified if elevated radiation levels are detected from test pit soil/materials and further direction will be provided to the field team.</p>

11.0 Biological Hazards and Controls

Biological hazards are everywhere and change with the region and season. If you encounter a biological hazard that has not been identified in this plan, contact the RHSM so that a revision to this plan can be made. Whether it is contact with a poisonous plant, a poisonous snake, or a bug bite, do not take bites or stings lightly. If there is a chance of an allergic reaction or infection, or to seek medical advice on how to properly care for the injury, contact the occupational nurse at 1-866-893-2514.

11.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or a buddy. If you are stung, contact the occupational nurse at 1-866-893-2514. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for an allergic reaction if you have never been stung before. Call 911 if the reaction is severe.

11.2 Feral Dogs

Avoid all dogs – both leashed and stray. Do not disturb a dog while it is sleeping, eating, or caring for puppies. If a dog approaches to sniff you, stay still. An aggressive dog has a tight mouth, flattened ears and a direct stare. If you are threatened by a dog, remain calm, do not scream and avoid eye contact. If you say anything, speak calmly and firmly. Do not turn and run, try to stay still until the dog leaves, or back away slowly until the dog is out of sight or you have reached safety (e.g. vehicle). If attacked, retreat to vehicle or attempt to place something between you and the dog. If you fall or are knocked to the ground, curl into a ball with your hands over your head and neck and protect your face. If bitten, contact the occupational nurse at 1-866-893-2514. Report the incident to the local authorities.

11.3 Mosquito Bites

Due to the recent detection of the West Nile Virus in the southwestern United States it is recommended that preventative measures be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent:

- Stay indoors at dawn, dusk, and in the early evening;
- Wear long-sleeved shirts and long pants whenever you are outdoors;
- Spray clothing with repellents containing permethrin or N,N-diethyl-meta-toluamide (DEET) since mosquitoes may bite through thin clothing;
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands; and
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3 to 15 days.

Contact the project RHSM with questions, and immediately report any suspicious symptoms to your supervisor, PM, and contact the occupational nurse at 1-866-893-2514.

11.4 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose its (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy



Poison Sumac



Poison Oak



Contamination with poison ivy, sumac or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed).
- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urushiol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you must work on a site with poison ivy, sumac or oak the following precautions are necessary:

- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac or oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be

decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.

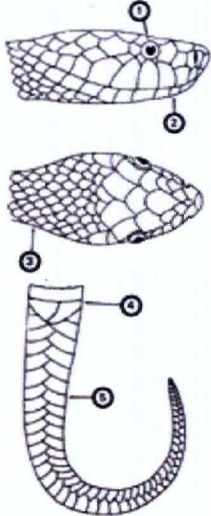
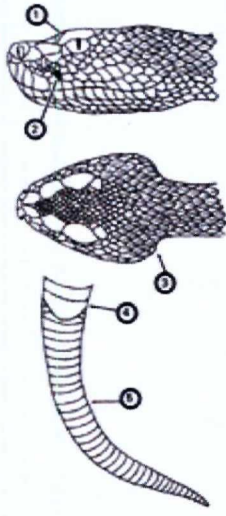
- Personal protective equipment, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanafel, Tecnu or other product designed for removing urushiol. If you do not have Zanafel or Tecnu wash with cold water. Do not take a bath, as the oils can form an invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.

If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

11.5 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
<ol style="list-style-type: none"> 1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail 	<ol style="list-style-type: none"> 1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail
	

11.6 Spiders - Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.

- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood;
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite;
- Elevate the bitten area, if possible;
- Do not apply a tourniquet. Do not try to remove venom; and
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider – especially if you think it is a poisonous spider.

Black Widow



Red Widow



Brown Widow



Brown Recluse



11.7 Ticks

Every year employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permethrin and spray skin with only DEET; and check yourself frequently for ticks.

Where site conditions (vegetation above knee height, tick endemic area) or when tasks (e.g., having to sit or kneel in vegetation) diminish the effectiveness of the other controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting field work. Avoid habitats where possible, reduce the abundance through habitat disruption or application of acaricide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this HSP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear that looks like a bullseye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever,

headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the Hours and Incident Tracking System [HITS] system on the VO) if you do come in contact with a tick.

12.0 Contaminants of Concern

The table below summarizes the potential contaminants of concern (COC) and their occupational exposure limit and signs and symptoms of exposure. The table also includes the maximum concentration of each COC and the associated location and media that was sampled (groundwater, soil boring, surface soil). These concentrations were used to determine engineering and administrative controls described in the "Project-Specific Hazard Controls" section of this HSP, as well as PPE and site monitoring requirements.

Contaminants of Concern					
Contaminant	Location and Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Benzene	SS: 20 mg/kg (SD-36) SW: 0.0007 mg/l (SWSD-30) GW: 23 mg/l (MW-12S)	1 ppm	500 Ca	Eye, nose, skin, and respiratory irritation; headache; nausea; dermatitis; fatigue; giddiness; staggered gait; bone marrow depression	9.24
Chromium	SS: 3,800 ppm (99 data) GW: 3.59 mg/l (MW-11S)	0.5 mg/ m ³ OR 0.0.5 mg/ m ³ depending on state (III or VI)	250 mg/ m ³	Irritation to the eyes, skin. Lung fibrosis.	NA
Cadmium	Solid: 58.7 mg/kg	0.005 mg/m ³	9 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
DDT-4,4	SS: 8.2 mg/kg (SWSD-32)	0.5 mg/m ³	500 Ca	Paresthesia of tongue, lips, hand, and face; tremors; dizziness; confusion; headache; fatigue; convulsion; eye and skin irritation; vomiting	UK
2,4-Dimethylphenol	GW: 1.5 mg/l (MW-12S)				
Lead	SS: 84.4 mg/kg (SD-36) SW: 0.71 mg/l (SWSD-31) GW: 0.05 mg/l (MW-11S)	0.05 mg/m ³	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Vinyl chloride	GW: 0.07 mg/l (MW-11S)	NIOSH CA OSHA 1 ppm	CA [N.D.]	Weakness, abdominal pain, Gastrointestinal bleeding, enlarged liver, pallor or cyan of extremities.. Carcinogen.	9.9
Xylenes	SS: 590 mg/kg (SD-36) GW: 0.18 mg/L (MW-17S)	100 ppm	900	Irritated eyes, skin, nose, and throat; dizziness; excitement; drowsiness; incoherence; staggering gait; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; dermatitis	8.56
Tetrachloroethylene (PCE)	SS: 19 mg/l (SD-36) SW: 0.001 mg/l (SWSD-34) GW: 4.8 mg/l (MW-11S)	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
Methyl isobutyl ketone (4-methyl-2-pentanone)	GW: 1.1 mg/l (MW-12S)	NIOSH 50 OSHA 100	500 ppm	Irritation to the eyes, skin, mucous membrane; Headache, narcosis, comma, dermatitis. In animals- liver and kidney damage.	9.3

Contaminants of Concern					
Contaminant	Location and Maximum ^a Concentration (ppm)	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
<p>Footnotes:</p> <p>^a Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), LNAPL (Light Non-aqueous Phase Liquid), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water).</p> <p>^b Appropriate value of permissible exposure limit (PEL), recommended exposure limit (REL), or threshold limit value (TLV) listed.</p> <p>^c IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.</p> <p>^d PIP = photoionization potential; NA = Not applicable; UK = Unknown.</p> <p>eV = electron volt mg/kg = milligram per kilogram mg/m³ = milligrams per cubic meter ug/m³ = micrograms per cubic meter</p>					
Potential Routes of Exposure					
Dermal: Contact with contaminated media. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of PPE.		Inhalation: Vapors and contaminated particulates. This route of exposure is minimized through use of engineering controls, administrative controls and proper use of respiratory protection when other forms of control do not reduce the potential for exposure.		Other: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).	

13.0 Site Monitoring

(Reference CH2M HILL SOP HSE-207, *Exposure Monitoring for Airborne Chemical Hazards*– see Attachment 12)

When performing site monitoring, record all the information, such as in a field logbook. Note date and time, describe monitoring location (for example, in breathing zone, at source and site location), and what the reading is. If any action levels are reached, note it in the field logbook and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment plus thirty years. Ensure that copies of the field log book are maintained in the project file.

Copies of all project exposure records (e.g., copies of field logbook pages where air monitoring readings are recorded and associated calibration) shall be sent to the regional SPA for retention and maintained in the project files.

13.1 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels ^a	Action to be Taken when Action Level reached	Frequency ^b	Calibration
Toxic Gas Monitor & CGI: MultiRAE Plus with 11.7 eV lamp (VOCs, O ₂ , LEL, CO, H ₂ S)	All Intrusive Task	BG* - 1→	Level D	Continuous during advancement of boring	Daily
	VOCs	1 – 5 ppm→ 5-500 ppm →	Level C; Contact HSM to determine appropriate action. Level B, not authorized, contact HSM		
	All Intrusive Task	0-10% LEL:	No explosion hazard		
	LEL	>10% LEL:	Explosion hazard; evacuate or ventilate		
	All Intrusive Task	>25% ^c O ₂ :	Explosion hazard; evacuate or vent		
	O ₂ :	20.9% ^c O ₂ : <19.5% ^c O ₂ :	Normal O ₂ O ₂ deficient; ventilate.	Continuous during advancement of boring	Daily
	All Intrusive Task	<1 ppm H ₂ S	Level D		
	H ₂ S	>1 ppm H ₂ S	Stop work, implement engineering controls, if concentrations >1ppm persist, contact HSM to determine appropriate path forward, including an upgrade in respiratory protection.		
	All Intrusive Task	0-25ppm	Level D		
	CO	≥25 ppm	Stop work, ventilate		
Dust Monitor: DataRAM or equivalent	Visual	Visual Dust→	Utilize Engineering controls (e.g. water or /fans)	Initially and periodically during tasks	Not Applicable
Radiation Meter/Detector: Alpha, Beta & Gamma Particles: Ludlum Model 3 with 44-9 pancake probe or equivalent	Test Pit Excavations	3 times the measured site background radiation level	Stop work at test pit where elevated radiation is detected. Use barricades to set up an exclusion zone around the perimeter of the test pit and take excavator/bucket out of service. Call H&S manager to discuss next steps.	On ground surface prior to starting digging & periodically with each excavated 'lift' of soil at each test pit	Verify manufacturer's calibration sticker on unit. Daily & periodic 'source check' of known material

Detector Tubes:	All Intrusive Task	0-0.5ppm 0.5-10ppm 10>ppm	Level D Level C Level B not authorized, contact HSM	Initially and periodically when PID/FID >1 ppm	Not applicable
Benzene specific 0.5/c (0.5 to 10 ppm range) with pre-tube, or equivalent					
Vinyl Chloride specific 0.5/c (0.5 to 10 ppm range) with pre-tube, or equivalent					

^a Action levels apply to sustained breathing-zone measurements above background.

^b The exact frequency of monitoring depends on field conditions and is to be determined by the SC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate.

^c If the measured percent of O₂ is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O₂ action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O₂ action levels are required for confined-space entry.

^d Noise monitoring and audiometric testing also required.

13.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: MultiRae PID, 11.7eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm PID ± 5%	1.5 lpm reg T- tubing
CGI: MultiRae or equivalent	LEL	100ppm methane	50% LEL ± 5%	1.5 lpm reg direct tubing
	O ₂	20.9%	20.9% O ₂ + 5%	1.5 lpm reg direct tubing
	H ₂ S	25 ppm H ₂ S	25ppm H ₂ S ± 5%	1.5 lpm reg direct tubing
	CO	50 ppm	50 ppm CO + 5%	1.5 lpm reg direct tubing

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name
- Serial Number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature, humidity and wind direction)
- Calibration/instrument readings
- Operator's name and signature
- Date and time

13.3 Integrated Personal Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the RHSM immediately if these contaminants are encountered.

Method Description

Based on historical and previous analytical data, no air sampling will be performed unless conditions change.

Personnel and Areas

Results must be sent immediately to the RHSM. Regulations may require reporting to monitored personnel. Results reported to:

RHSM: Carl Woods/CIN

Other: Mark Orman/MKE

14.0 Personal Protective Equipment

(Reference CH2M HILL- SOP HSE-117, *Personal Protective Equipment*– see Attachment 12)

14.1 Required Personal Protective Equipment

PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.

A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM that approved this plan. Below are items that need to be followed when using any form of PPE:

- Employees must be trained to properly wear and maintain the PPE;
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area;
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner;
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage;
- PPE must be maintained in a clean and reliable condition;
- Damaged PPE shall not be used and must either be repaired or discarded; and
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

Project-Specific Personal Protective Equipment Requirements^a

Task	Level	Body	Head	Respirator ^b
-General site entry -Surveying -Observation of material loading for offsite disposal	D	Work clothes; safety toed leather work boots and gloves	Hardhat ^c Safety glasses with side shields Ear protection ^d	None required
- Collection of subsurface soil, IDW, and groundwater samples - Drilling/Piezometer Installation - Vegetation Clearance - Road Construction - Groundwater Elevation and LNAPL Thickness Measurements	Modified D	Work clothes or cotton coveralls Boots: Safety-toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves. OR Work Clothes or Coveralls. SC to determine body protection based on potential contact with site contaminants. If outer layer of personal clothing cannot be kept clean, then outer cotton coveralls or uncoated Tyvek coveralls shall be worn. (Polycoated Tyvek when there is potential to contact contaminated groundwater or free liquids from drums.)	Hardhat ^c Safety glasses with side shields Ear protection ^d	None required

Investigation-derived waste (drum) management	Modified D	Coveralls: Uncoated Tyvek® Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Safety glasses with side shields Ear protection ^d	None required.
Work near vehicular traffic ways or earth moving equipment.	All	Appropriate level of ANSI/ISEA 107-2004 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	
Task Requiring upgrade - None anticipated	C	Coveralls: Polycoated Tyvek® Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; [Benzene/Vinyl Chloride] ^e .
Tasks requiring upgrade - None anticipated	B	Coveralls: Polycoated Tyvek® Boots: Safety -toe, chemical-resistant boots OR Safety -toe, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat ^c Splash shield ^c Ear protection ^d Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA); MSA Ultralite, or equivalent.

Reasons for Upgrading or Downgrading Level of Protection (with approval of the RHSM)

Upgrade ^f	Downgrade
<ul style="list-style-type: none"> Request from individual performing tasks. Change in work tasks that will increase contact or potential contact with hazardous materials. Occurrence or likely occurrence of gas or vapor emission. Known or suspected presence of dermal hazards. Instrument action levels in the "Site Monitoring" section exceeded. 	<ul style="list-style-type: none"> New information indicating that situation is less hazardous than originally thought. Change in site conditions that decrease the hazard. Change in work task that will reduce contact with hazardous materials.

^a Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

^b No facial hair that would interfere with respirator fit is permitted.

^c Hardhat and splash-shield areas are to be determined by the SC.

^d Ear protection should be worn when conversations cannot be held at distances of 3 feet (1 meter) or less without shouting.

^e See cartridge change-out schedule.

^f Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

14.2 Respiratory Protection

(Reference CH2M HILL SOP HSE-121, *Respiratory Protection*– see Attachment 12)

Implement the following when using respiratory protection:

- Respirator users must have completed appropriate respirator training within the past 12 months. Level C training is required for air-purifying respirators (APR) use and Level B training is required for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) use. Specific training is required for the use of powered air-purifying respirators (PAPR).
- Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used.
- Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months.
- Respirator use shall be limited to those activities identified in this plan. If site conditions change that alters the effectiveness of the specified respiratory protection, the RHSM shall be notified to amend the written plan.
- Tight-fitting facepiece respirator users shall be clean-shaven and shall perform a user seal check before each use.
- Canisters/cartridges shall be replaced according to the change-out schedule specified in this plan. Respirator users shall notify the SC or RHSM of any detection of vapor or gas breakthrough. The SC shall report any breakthrough events to the RHSM for schedule upgrade.
- Respirators in regular use shall be inspected before each use and during cleaning
- Respirators in regular use shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition.
- Respirators shall be properly stored to protect against contamination and deformation.
- Field repair of respirators shall be limited to routine maintenance. Defective respirators shall be removed from service.
- When breathing air is supplied by cylinder or compressor, the SC or RHSM shall verify the air meets Grade D air specifications.
- The SC or designee shall complete the H&S Self-Assessment Checklist – Respiratory Protection included in as attachment to this plan to verify compliance with CH2M HILL's respiratory protection program.

Respirator Change-Out Schedule

Contaminant	Change-Out Schedule
Benzene	End-of-service life or end of shift (whichever occurs first)
Vinyl Chloride	End-of-service life or end of shift (whichever occurs first)

15.0 Worker Training and Qualification

15.1 CH2M HILL Worker Training

(Reference CH2M HILL SOP HSE-110, *Training*– see Attachment 12)

15.1.1 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

15.1.1.1 Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

15.1.1.2 Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

15.1.1.3 Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

15.1.1.4 Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as Safety Coordinator - Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor trained.

15.1.2 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR

training. Bloodborne pathogen training located on CH2M HILL's Virtual Office is also required for those designated as first aid/CPR trained.

15.1.3 Safety Coordinator Training

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific HSP for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SCs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

15.1.4 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

15.1.5 Project-Specific Training Requirements

Project-specific training for this project includes:

- Training on CH2M HILL HSP and AHAs;
- Training on subcontractor AHAs;
- Qualified excavation competent person (subcontractor);
- Qualified drill rig operator (subcontractor);

The training listed below is required computer-based training located on CH2M HILL's Virtual Office (VO) at

https://www.int.ch2m.com/safety%5Fcounts/Training/Computer_Based_Courses.asp

- Lifting training (part of new employee orientation training or available on the Virtual Office);
- Noise training (on the Virtual Office)

16.0 Medical Surveillance and Qualification

All site workers participating in hazardous waste operations or emergency response will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (e.g., physician's written opinion) will be maintained in the project files and made available for inspection.

16.1 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in on site hazardous waste operations or emergency response are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician's written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee's assigned work. The physician's written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

16.2 Job or Site-Specific Medical Surveillance

Due to the nature of hazards for a particular job or work site, specialized medical surveillance may be necessary. This surveillance could include biological monitoring for specific compounds, or specialized medical examinations.

- N/A

16.3 Respirator User Qualification

Personnel required to wear respirators must have a current medical qualification to wear respirators. Medical qualification shall consist of a qualified physician's written opinion regarding the employee's ability to safely wear a respirator in accordance with 29 CFR 1910.134.

16.4 Hearing Conservation

Personnel working in hazardous waste operations or operations that fall under 29 CFR 1910.95 and exposed to noise levels in excess of the 85dBA time-weighted average shall be included in a hearing conservation program that includes annual audiometric testing.

17.0 Site-Control Plan

17.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*– see Attachment 12)

Site control is established to prevent the spread of contamination throughout the site and to ensure that only authorized individuals are permitted into potentially hazardous areas.

The SC will implement site control procedures including the following bulleted items.

- Establish support, contamination reduction, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
 - Line-of-sight and hand signals;
 - Air horn; and
 - Two-way radio or cellular telephone if available.
- Establish offsite communication.
- Establish and maintain the “buddy system.”

17.2 Remediation Work Area Zones

(Reference CH2M HILL SOP HSE-218 *Hazardous Waste Operations*– see Attachment 12)

A three-zone approach will be used to control areas where site contaminants exist. Access will be allowed only after verification of appropriate training and medical qualification. The three-zone approach shall include an EZ, Contamination Reduction Zone (CRZ) and a Support Zone (SZ). The three-zone approach is not required for construction work performed outside contaminated areas where control of site contamination is not a concern.

Specific work control zones shall be established as necessary during task planning. Site work zones should be modified in the field as necessary, based on such factors as equipment used, air monitoring results, environmental conditions, or alteration of work plans. The following guidelines shall be used for establishing and revising these preliminary zone designations.

17.2.1 Support Zone

The SZ is an uncontaminated area (trailers, offices, field vehicles, etc.) that will serve as the field support area for most operations. The SZ provides field team communications and staging for emergency response. Appropriate sanitary facilities and safety and emergency response equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged and decontaminated materials, or personnel with medical emergencies that cannot be decontaminated.

17.2.2 Contamination Reduction Zone

The CRZ is established between the EZ and the SZ, upwind of the contaminated area where possible. The CRZ provides an area for decontamination of personnel, portable handheld equipment and tools, and heavy equipment. In addition, the CRZ serves as access for heavy equipment and emergency support services.

17.2.3 Exclusion Zone

The EZ is where activities take place that may involve exposure to site contaminants and/or hazardous materials or conditions. This zone shall be demarcated to prevent unauthorized entry. More than one EZ may be established if there are different levels of protection to be employed or different hazards that exist in the same work area. The EZ shall be large enough to allow adequate space for the activity to be completed, including field personnel and equipment, as well as necessary emergency equipment.

The EZ shall be demarcated with some form of physical barrier or signage. The physical barrier or signage shall be placed so that they are visible to personnel approaching or working in the area. Barriers and boundary markers shall be removed when no longer needed.

17.2.4 Other Controlled Areas

Other work areas may need to be controlled due to the presence of an uncontrolled hazard, to warn workers of requirements, or to prevent unauthorized entry. Examples include general construction work areas, open excavations, high noise areas, vehicle access areas, and similar activities or limited access locations. These areas shall be clearly demarcated with physical barriers (fencing, cones, reinforced caution tape or rope) as necessary and posted with appropriate signage.

18.0 Decontamination

Decontamination areas will be established for work in potentially contaminated areas to prevent the spread of contamination. Decontamination areas should be located upwind of the exclusion zone where possible and should consider any adjacent or nearby projects and personnel. The SC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SC. The SC must ensure that procedures are established for disposing of materials generated on the site.

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SC should establish areas for eating, drinking, and smoking.

18.1 Contamination Prevention

Preventing or avoiding contamination of personnel, tools, and equipment will be considered in planning work activities at all field locations. Good contamination prevention and avoidance practices will assist in preventing worker exposure and result in a more efficient decontamination process. Procedures for contamination prevention and avoidance include the following:

- Do not walk through areas of obvious or known contamination;
- Do not directly handle or touch contaminated materials;
- Make sure there are no cuts or tears in PPE;
- Fasten all closures in suits and cover them with duct tape, if appropriate;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contamination, where possible;
- Do not eat or drink in contaminated work areas;
- Do not carry food, beverages, tobacco, or flame-producing equipment into contaminated work areas;
- Minimize the number of personnel and amount of equipment in contaminated areas to that necessary for accomplishing the work;
- Choose tools and equipment with nonporous exterior surfaces that can be easily cleaned and decontaminated;
- Cover monitoring and sampling equipment with clear plastic, leaving openings for the sampling ports, as necessary; and
- Minimize the amount of tools and equipment necessary in contaminated areas.

18.2 Personnel and Equipment Decontamination

Personnel exiting an EZ must ensure that they are not spreading potential contamination into clean areas or increasing their potential for ingesting or inhaling potential contaminants. Personal decontamination may range from removing outer gloves as exiting the EZ, to proceeding through an outer layer doffing station including a boot and glove wash and rinse, washing equipment, etc. Equipment that has come into contact with contaminated media must also be cleaned/decontaminated when it is brought out of the EZ.

18.3 Decontamination during Medical Emergencies

Standard personnel decontamination practices will be followed whenever possible. For emergency life saving first aid and/or medical treatment, normal decontamination procedures may need to be abbreviated or omitted. In this situation, site personnel shall accompany contaminated victims to advise

emergency response personnel on potential contamination present and proper decontamination procedures.

Outer garments may be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Protective clothing can be cut away. If the outer garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances or medical personnel. Outer garments can then be removed at the medical facility.

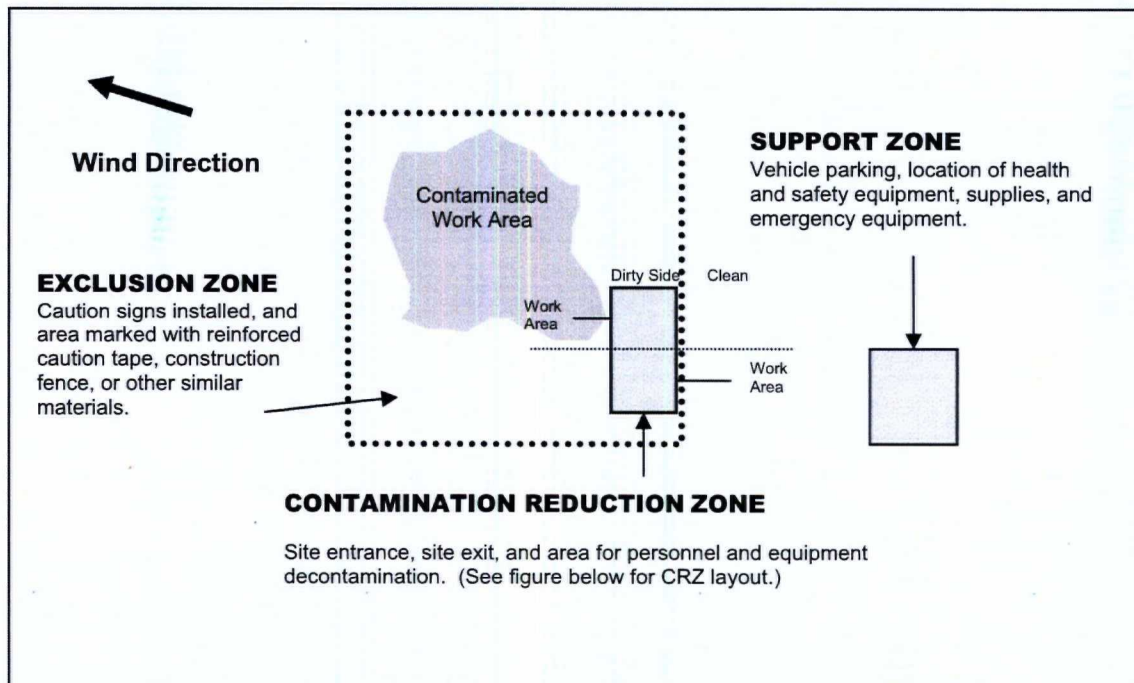
18.4 Waste Collection and Disposal

All contaminated material generated through the personnel and equipment decontamination processes (e.g., contaminated disposable items, gross debris, liquids, sludges) will be properly containerized and labeled, stored at a secure location, and disposed in accordance with the project plans.

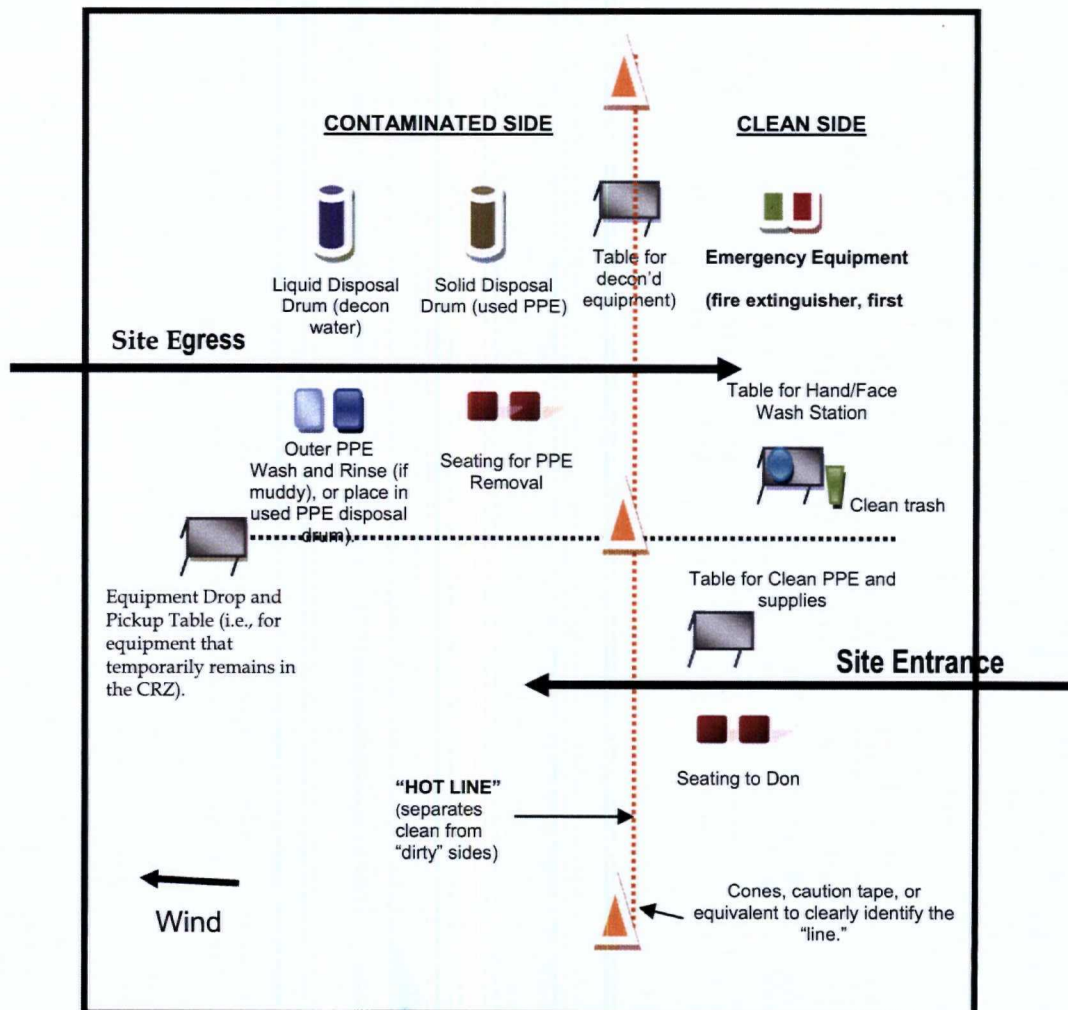
18.5 Diagram of Personnel-Decontamination Line

The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SC to accommodate task-specific requirements.

Work Area - Set up appropriately based on wind direction



Typical Contamination Reduction Zone



19.0 Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*— see Attachment 12)

19.1 Pre-Emergency Planning

- The Emergency Response Coordinator (ERC), typically the SC or designee, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the ERC include:
- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post the “Emergency Contacts” page and route to the hospital located in this section in project trailer(s) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated.
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital. Drills should take place periodically but no less than once a year.
- Brief new workers on the emergency response plan.
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

19.2 Emergency Equipment and Supplies

The ERC should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 (or two 10) lb. class A,B,C fire extinguisher	Field Vehicle/Support Zone/Office Trailer
First aid kit	Field Vehicle/Support Zone/Office Trailer
Eye Wash	Field Vehicle/Support Zone/Office Trailer
Potable water	Field Vehicle/Support Zone/Office Trailer
Bloodborne-pathogen kit	Field Vehicle/Support Zone/Office Trailer

19.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel.
- Shut down CH2M HILL operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.
- Implement HSE-111, Incident Notification, Reporting and Investigation.
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in the "Incident Notification, Reporting, and Investigation" section of this HSP.

19.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing/heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in this section.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation* (see Attachment 12).
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, Incident Notification, Reporting and Investigation (see Attachment 12), and complete incident report using the HITS system on the Virtual Office or if not feasible, use the hard copy forms provided as an attachment to this HSP.
- Notify and submit reports to client as required in contract.

19.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.

- The ERC and a “buddy” will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The ERC will follow the incident reporting procedures in the “Incident Notification, Reporting and Investigation” section of this HSP.

19.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

19.7 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop--seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area.
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae and towers.
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding.
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands.
- Do not use telephones during electrical storms, except in the case of emergency

Remember that lightning may strike several miles from the parent cloud, so work should be stopped/restarted accordingly. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

19.7.1 Tornado Safety

Recognizing imminent tornado signs include seeing an unusually dark sky, possibly with some green or yellow clouds. You may hear a roaring or rumbling sound like a train, or a whistling sound like a jet. Large hail may also be falling. You may be able to see funnels, or they may be hidden by rain or hail.

Listen to your radio for tornado warnings during bad thunderstorms. If a tornado warning is issued, don't panic. Instead, listen and look. Quickly but calmly follow directions for getting to shelter.

Take cover. Indoors you should go down into the basement and crouch down under the stairs, away from windows. Do not take an elevator. If you can't get to a basement, go into a closet or bathroom and pull a mattress over you or sit underneath a sturdy piece of furniture on the ground floor near the center of the building. Pull your knees up under you and protect your head with your hands.

A bad place to be in a tornado is in a building with a large freestanding roof such as a gymnasium, arena, auditorium, church or shopping mall. If you are caught in such a building, take cover under something sturdy.

More than half of tornado deaths occur in mobile homes. If a tornado threatens, get out and go to a building with a good foundation, or lay down in a ditch away from vehicles and other objects.

If you are driving, get to a shelter, lie down in a ditch or seek cover up under the girders of an overpass or bridge. Stay as close to the ground as you can. Protect your head and duck flying debris.

Stay away from metal and electrical equipment because lightning accompanies tornadoes.

If you have time before the tornado strikes, secure objects such as garbage cans and lawn furniture which can injure people. While most tornado damage is a result of the violent winds, most injuries and deaths actually result from flying debris.

Emergency Contacts

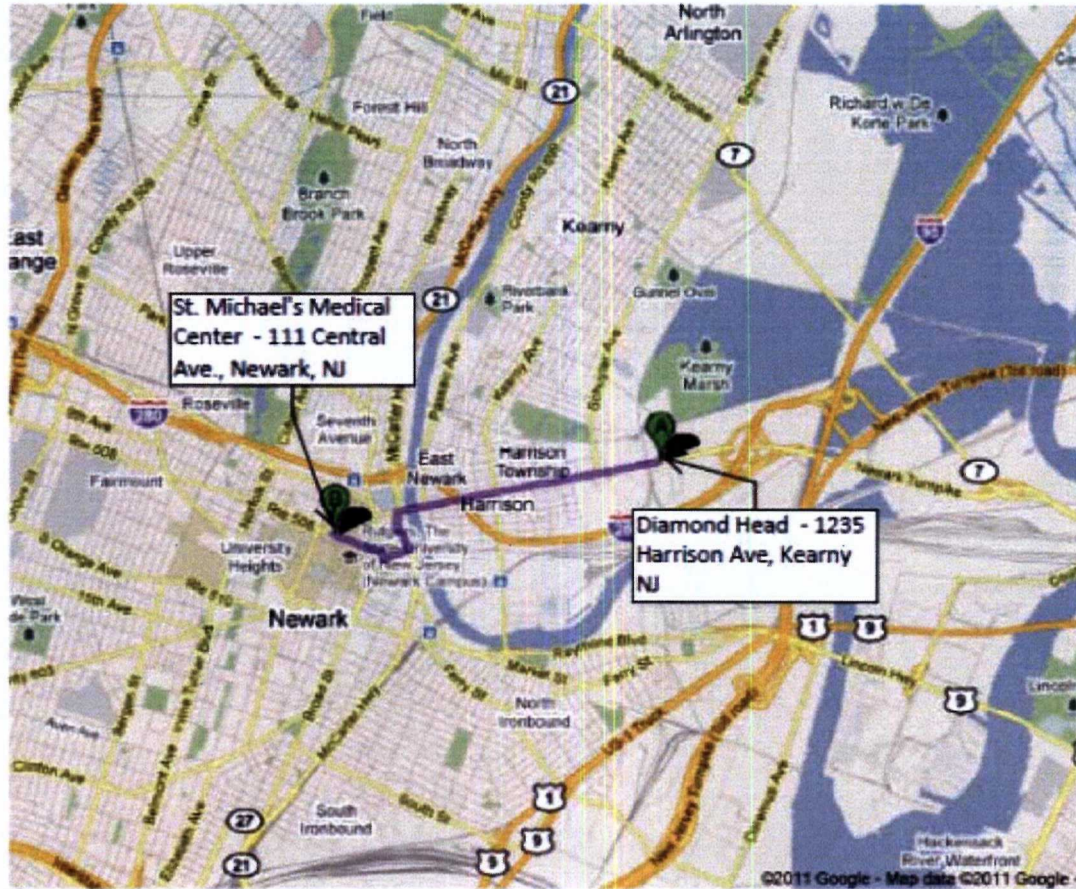
24-hour CH2M HILL Injury Reporting– 1-866-893-2514
24-hour CH2M HILL Serious Incident Reporting Contact – 720-286-4911

Medical – 911	Medi-T Inc 815 Summer Ave Newark, NJ 07104 Phone: 973-481-4004	CH2M HILL- Medical Consultant WorkCare Dr. Peter Greaney M.D. 300 S. Harbor Blvd, Suite 600 Anaheim , CA 92805 800-455-6155/866-893-2514 714-978-7488
Fire/Spill – 911	Kearny Fire Dept 110 Maple St Kearny, NJ 07032 Phone: 201-991-1402	CH2M HILL Director – Health, Safety, Security & Environment Andy Strickland/DEN (720) 480-0685 (cell) or (720) 286-2393 (office)
Police – 911	Kearny Police Dept 237 Laurel Ave Kearny, NJ 07032 Phone : 201-998-1313	CH2M HILL Responsible Health and Safety Manager (RHSM) Name: Carl Woods Phone: (513) 319-5771
Utilities Emergency Phone Numbers Water: NA Gas: NA Electric: NA		CH2M HILL Human Resources Department Name: Cindy Bauder/WDC Phone: (703) 376-5027
Project Manager (PM) Name: Juliana Hess/NJO Phone: 201-602-1557 (cell)		CH2M HILL Worker's Compensation: Contact Business Group HR dept. to have form completed or contact Jennifer Rindahl after hours: (720)891-5382
CH2M HILL Safety Coordinator (SC) Name: Austin Harclerode Phone: 201-532-2885		Media Inquiries Corporate Strategic Communications Name: John Corsi Phone: (720) 286-2087
CH2M HILL Project Environmental Manager Name: Terri Gerrish Phone: (973) 316-3516		Automobile Accidents Rental: Jennifer Rindahl/DEN: 720-286-2449 CH2M HILL owned vehicle: Linda George/DEN: 720-286-2057
Federal Express Dangerous Goods Shipping Phone: 800/238-5355		CHEMTEL (hazardous material spills) Phone: 800/255-3924
Facility Alarms: None (Honking Car Horn)		Evacuation Assembly Area(s): Main Gate to Site

Facility/Site Evacuation Route(s): Follow clear path to front of property.

Directions to Local Hospital

Route to Hospital



Directions from the Site:

From: Vacant lot adjacent to 1235 Harrison Avenue, Kearny, NJ 07029 (Hudson County)

To: St. Michael's Medical Center, 111 Central Avenue, Newark, NJ 07102

- | | |
|---|-----------|
| 1.) Head west on Harrison Ave. toward Greenfield Ave. | 1.6 miles |
| 2.) Turn left onto NJ-21S | 0.3 miles |
| 3.) Turn right onto Rector St. | 0.2 miles |
| 4.) Turn right onto Rte 508 | 0.3 miles |
| 5.) Hospital on the right | |

20.0 Spill Containment Procedures

CH2M HILL and subcontractor personnel working at the project site shall be knowledgeable of the potential health, safety and environmental concerns associated with petroleum and other substances that could potentially be released at the project site.

The following is a list of criteria that must be addressed in CH2M HILL's or the subcontractor's plans in the event of a spill or release. In the event of a large quantity spill notify emergency services. Personnel discovering a spill shall (only if safe to do so):

- Stop or contain the spill immediately (if possible) or note source. Shut off the source (e.g., pump, treatment system) if possible. If unsafe conditions exist, then leave the area, call emergency services, inform nearby personnel, notify the site supervisors, and initiate incident reporting process. The SC shall be notified immediately;
- Extinguish sources of ignition (flames, sparks, hot surfaces, cigarettes);
- Clear personnel from the spill location and barricade the area;
- Use available spill control equipment in an effort to ensure that fires, explosions, and releases do not occur, recur, or spread;
- Use sorbent materials to control the spill at the source;
- Construct a temporary containment dike of sorbent materials, cinder blocks, bricks or other suitable materials to help contain the spill;
- Attempt to identify the character, exact source, amount, and extent of the released materials. Identification of the spilled material should be made as soon as possible so that the appropriate cleanup procedure can be identified;
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required;
- Assess possible hazards to human health or the environment as a result of the release, fire or explosion; and
- Follow incident notification, reporting, and investigation procedures detailed in HSE SOP-111 (see Attachment 12).
-

21.0 Inspections

21.1 Management Health, Safety, Security, and Environment Inspections

The Management Inspection Checklist (attached to this plan) is intended to facilitate PM leadership, provide an opportunity for PM's to mentor field staff on HSE and identify any big picture actions that need to be addressed. Observations that would improve global HSE program should also be included on the form. This Checklist does NOT take the place of a formal HSE audit. The PM shall:

- Complete one checklist per month during field work when visiting the site. The PM may delegate completion to the task lead, field team leader, or construction manager if the project is short duration and a visit is not planned for.
- Complete applicable sections of the checklist (can be typed or hand-written). Address issues with the field team, taking the opportunity to mentor staff by identifying the "root cause" of observation (e.g., why are SBOs not being completed, had this hazard been noted by any other team members?).
- Send completed form to Project Delivery Manager, Sector HSE Lead, and RHSM for tracking and review. Original should be kept in the project files.

21.2 Project Activity Self-Assessment Checklists

In addition to the hazard controls specified in this document, Project Activity Self-Assessment Checklists are contained as an attachment to this HSP. The Project-Activity Self-Assessment Checklists are based upon minimum regulatory compliance and some site-specific requirements may be more stringent. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. The self-assessment checklists, including documented corrective actions, shall be made part of the permanent project records and maintained by the SC.

The self-assessment checklists will also be used by the SC in evaluating the subcontractors and any client contractors' compliance on site.

The self-assessment checklists for the following tasks and exposures are required when the task or exposure is initiated and weekly thereafter while the task or exposure is taking place. The checklists shall be completed by the SC or other CH2M HILL representative and maintained in project files.

- Hand and Power Tools
- Drilling
- excavation
- Heavy Equipment
- Traffic Control
- Hazardous Materials Handling

21.3 Safe Behavior Observations

Safe Behavior Observations (SBOs) are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss.

The SC or designee shall perform at least one SBO each week for any field work performed by subcontractors or when there are at least two CH2M HILL personnel performing field work.

The SC or designee shall complete the SBO form (attached to this HSP) for the task/operation being observed and submit them weekly.

For Federal projects, SBOs may be submitted electronically by e-mailing them to the address, "CH2M HILL ES FED Safe Behavior Observations" when connected to the network or at CH2MHILLESFEDSafeBehaviorObservation@ch2m.com.

22.0 Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, *Incident Notification, Reporting and Investigation*– see Attachment 12)

22.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public
- Damage to property or equipment
- Interruptions to work or public service (e.g., hitting a utility)
- Incidents which attract negative media coverage
- Near misses
- Spills, leaks, or regulatory violations
- Motor vehicle accidents

Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SC and maintained onsite for the duration of the project.

22.2 Section Definitions

Incident: an undesired event which results or could have resulted in loss through injury, damage to assets or environmental harm. This includes all of the definitions below.

Accident: an incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: an unsafe act or incident which, in other circumstances, could have resulted in loss through injury, damage to assets, or environmental harm.

Serious Incident:

- All fatalities including contractors, subcontractors, third parties, or members of the public
- Kidnap/Missing Person
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage.
- Acts or threats of terrorism
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SC.

The SC shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name/Site Manager
- Date and time of incident

- Description of incident
- Extent of no injuries/damage
- Level of medical attention
- Preliminary root cause/corrective actions

The SC shall complete an entry into the Hours and Incident Tracking System (HITS) database system located on CH2M HILL's Virtual Office (or if VO not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA and the police.

22.4 HITS System and Incident Report Form (IRF)

It is the policy of CH2M HILL to maintain a HITS entry into CH2M Hill's internal online reporting system for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

22.5 Injury Management/Return-to-Work (for CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work- *see Attachment 12*)

22.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program.
- Become familiar with the Notification Process (detailed below).
- Post the Injury Management/Return-to-Work Notification Poster.

22.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their Supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment) with the supervisor or SC accompany the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.

- Supervisor/SC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured/ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

22.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, *Incident Reporting, Notification and Investigation*– see Attachment 12)

The serious incident reporting requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security and Environment and Firm Wide Security Operations requirements for the consistent reporting of and managing of serious events throughout our operations.

22.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

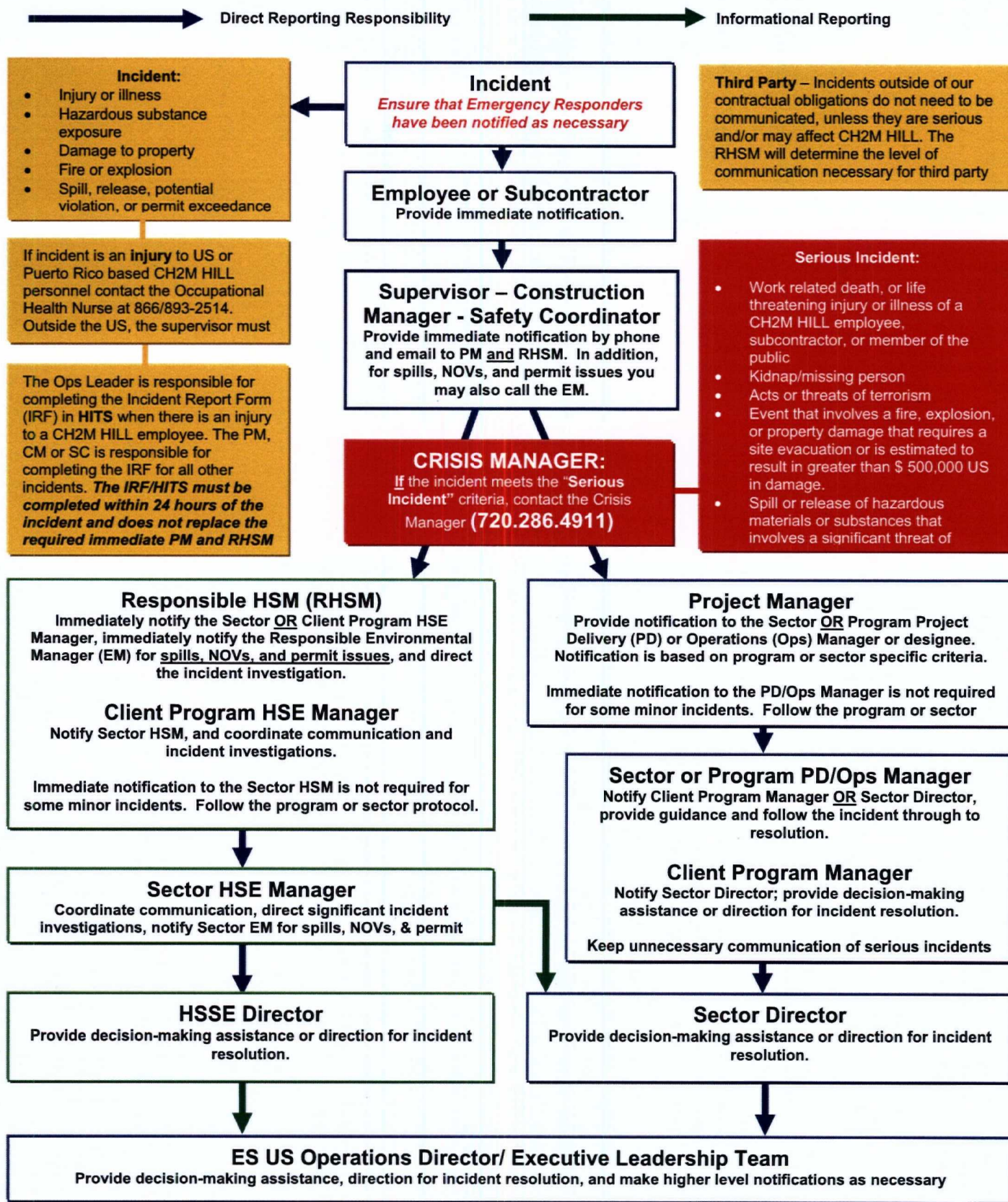
- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public;
- Kidnap or missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

22.6.2 Serious Incident Reporting

If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

ESBG US Operations Incident Reporting Flow Diagram



Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.

22.7 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. The investigation team will consist of the SC (with support from RHSM), appropriate subcontractor personnel as necessary, the PM, and the responsible supervisor. More participants may be involved as needed to complete the investigation.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must use the Root Cause Analysis Flow Chart to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

22.7.1 Personal Factors

- Lack of skill or knowledge
- Correct way takes more time and/or requires more effort
- Short-cutting standard procedures is positively reinforced or tolerated
- Person thinks there is no personal benefit to always doing the job according to standards

22.7.2 Job Factors

- Lack of or inadequate operational procedures or work standards
- Inadequate communication of expectations regarding procedures or standards
- Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

22.7.3 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

- The RHSM will inform the Responsible Environmental Manager (REM) of any environmental incidents.
- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, REM, or FWSO. The Business Group (BG) HSE Lead will review all BG incidents and modify as required.
- Incident Investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

23.0 Records and Reports

An organized project filing system is essential for good documentation and recordkeeping. There are many benefits to an organized filing system:

- Other CH2M HILL employees can easily and quickly find documents;
- Records are readily available for review;
- Records may be needed during OSHA investigations, audits, or other legal matters;
- Records may be needed on short notice in case of an accident, illness or other emergency; and
- Systematic recordkeeping aids in overall project organization.

The project filing system shall be established at the beginning of the project and maintained throughout all phases of construction and archived in accordance with CH2M HILL's Records Retention Policy. The information contained in the filing system shall be updated regularly and/or as specified in this document. The PM and SC are responsible for collecting documentation, including subcontractor documentation, and maintaining a complete and organized filing system.

Below are examples of records that must be maintained as the project progresses:

- Exposure records includes air monitoring data (including calibration records), MSDSs, exposure modeling results;
- Physical hazard exposure records include noise, ionizing radiation, non-ionizing radiation, vibration, and lasers exposure assessments and measurements;
- Respiratory fit test records;
- Training records;
- Incident reports, investigations and associated back-up information such as agency notifications, calculations, and corrective actions taken;
- Federal or state agency inspection records;
- Other Records:
 - Ergonomic evaluations;
 - HSE audits and assessments;
 - Project-specific HSE plans;
 - Confined space entry permits;
 - Equipment inspections;
 - Equipment maintenance;
 - Emergency equipment inspection records;
 - SBOs;
 - Self-assessment checklists
- The RHSM shall coordinate with the PM or designee to ensure that final project-specific HSE records described in this section, including negative exposure determinations, are maintained with the project files in accordance with the CH2M HILL records retention schedule, or forwarded to the Medical Surveillance Program Administrator, as appropriate. Records retention requirements are detailed in the Recordkeeping and Access to Records SOP, HSE-119 (see Attachment 12).

CH2M HILL Health and Safety Plan
Attachment 1

Health and Safety Plan Employee Sign-off Form

Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: Diamond Head

Project Number: 388641[illegible]

CH2M HILL Health and Safety Plan
Attachment 2

Chemical Inventory/Register Form

CHEMICAL INVENTORY/REGISTER FORM

Refer to SOP HSE-107, Attachment 1 (see Attachment 12 of this HASP), for instructions on completing this form.

Location: Diamond Head

HCC:

☐ Office

☐ Warehouse

☐ Laboratory

☐ Project:

Project No.: 388641

Regulated Product	Location	Container labeled (✓if yes)	MSDS available (✓if yes)

MSDS for the listed products will be maintained at:

CH2M HILL Health and Safety Plan

Attachment 3

Chemical-Specific Training Form

CHEMICAL-SPECIFIC TRAINING FORM

Refer to SOP HSE-107 Attachment 1 (see Attachment 12 of this HASP) for instructions on completing this form.

Location: Diamond Head

Project #: 388641

HCC:

Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- ☐ Physical and health hazards
- ☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- ☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

CH2M HILL Health and Safety Plan

Attachment 4

Project Activity Self-Assessment Checklists/Permits/Forms

- Chainsaw Operations
- Drilling
- Earthmoving Equipment
- Excavations
- Hand and Power Tools
- Hazardous Materials
- Lifting
- Traffic Control
- Vinyl Chloride

CH2MHILL

HS&E Self-Assessment Checklist—CHAINSAW OPERATIONS

Page 1 of 4

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are operating chainsaws, and/or (2) CH2M HILL is providing oversight of a subcontractor operating a chainsaw.

Safety Coordinators may consult with chainsaw subcontractors when completing this checklist, but shall not direct the means and methods of chainsaw operations nor direct the details of corrective actions. Chainsaw subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to chainsaw hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with chainsaw HS&E requirements
Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-49.

SECTION 1

SAFETY EQUIPMENT (2.3)

1. Chainsaw equipped with spark arrestor and fully functioning chain brake
2. Chainsaw operator's manual readily available
3. Fully stocked first aid kit and multipurpose fire extinguisher available
4. Appropriate personal protective equipment available and worn
5. Clothing free of loose edges that could become entangled in the saw

Yes No N/A N/O

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PLANNING ACTIVITIES (2.5)

6. Operators have read the chainsaw operator's manual
7. If aerial lifts to be used, aerial lift training completed
8. Daily safety briefing/meeting conducted with project personnel to discuss planned work
9. Immediate area surrounding operation cleared of obstructions
10. Companion maintained within calling distance of the chainsaw operator

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HSE-602A-2 VERSION 1

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SECTION 1 (Continued)				
	Yes	No	N/A	N/O
INSPECTION (3.1.1)				
11. Chain tension, sharpness, condition, and guide gap checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Chainsaw components checked for physical damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Chain does not rotate at idle with chain brake off	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Chain brake and stop switch operating correctly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Throttle trigger can not be engaged until throttle trigger lock out pressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
STARTING THE ENGINE (3.1.2)				
16. Chainsaw operator's manual consulted for proper starting procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Saw placed on level ground with guide bar and chain off the ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Saw is not drop-started	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAFE OPERATION (3.1.3)				
19. Chainsaw handles kept dry, clean, and free of oil or fuel mixture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Chainsaws held firmly with both hands and used right-handed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Operator standing to the left of the saw out of the plane of the chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Saw used between the waist and mid-chest level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Full throttle maintained while cutting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Operator aware of position of guide bar tip, does not contact tip with anything being cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Bumper spikes maintained as close to the object as possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Operator aware of what is in the saw's downward path after the cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. No attempt to made to cut material that is larger than the guide bar of the saw	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Cuts avoided that will cause chain to jam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Non-metallic wedges used to prevent compression cuts from jamming the blade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Bystanders and helpers kept at a safe distance from operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Chainsaw not operated when fatigued	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Fire extinguisher present when operating the chainsaw in forest or brushy areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ELECTRICAL CHAINSAW PRECAUTIONS (3.1.3)				
33. Extension cords approved for outdoor use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Electrical cords equipped with third-wire grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Ground fault circuit interrupter (GFCI) used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Electrical cord positioned carefully to avoiding cutting with saw or trip hazard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Saw switched to the off position before completing electrical connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Saw unplugged before making adjustments and when not in use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
REFUELING THE ENGINE (3.1.4)				
39. Fuel mixed in accordance with the manufacturer's recommendations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Fuel stored and transported in an approved safety container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Engine shut off and allowed to cool before refueling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Fire extinguisher present during fueling and refueling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Area around refueling site free from combustible materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Smoking around fueling or refueling operations prohibited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Funnel/flexible nozzle used to avoid spilling fuel on the engine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TRANSPORT AND STORAGE (3.1.5)				
46. Chainsaws carried with engine off and guide bar pointing to rear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Chain guard attached or placed in carrying case prior to transporting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Fuel tank drained and spark plug disconnected for long-term storage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Chainsaw placed in scabbard or secured to platform prior to transporting in aerial lift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 1 (Continued)				
	Yes	No	N/A	N/O
TOPPING UTILITY POLES (3.2.1)				
50. CH2M HILL only topping utility poles from an aerial lift platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Aerial lifts operated safely (use aerial lift checklist in HS-41)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Maximum length of pole section cut at one time does not exceed 2'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Pole tested for stray voltage with foreign voltage detector prior to cutting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Wiring, staples, nails, and other hardware removed within 4" of cut path	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Saw handled between chest and waist level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Personnel below pole safe distance from the fall area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Cutting stopped leaving approximately one half inch of pole uncut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Pole section removed manually by pulling cut section towards body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Cut pole sections lowered by rope or placed in aerial lift platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Rough edges hammered over after last cut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TREE FELLING (3.2.2)				
61. CH2M HILL not felling trees beyond scope of SOP HS-49	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Power company contacted prior to felling trees within two tree lengths of power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Underground services checked that could be damaged when tree strikes the ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Danger zone created two tree lengths from public areas, public removed from danger zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Personnel maintain a distance equal to two tree lengths of the tree being felled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66. Intended direction of fall determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Suitable escape path determined and maintained clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68. Equipment needed to prevent tree from sitting back on the saw determined and readily available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69. Undercut notch cut on side of the tree in the direction of the fall line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70. Back cut started 1-2" inches above the undercut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71. As tree starts to fall, saw shut off and operator steps into the escape path	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LIMBING STANDING TREES (3.2.3)				
72. CH2M HILL not operating chainsaws where overhead electrical power lines may be contacted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73. Only subcontractors with special training permitted to work around electrical power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74. Branches/limbs not cut above shoulder height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75. If limbing from a ladder, ladder secured in position and operator independently secured	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76. Chainsaws not used from rope and harness unless operator has received specific training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LIMBING FALLEN TREES (3.2.4)				
77. No dead branches/other debris hanging above work that may fall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78. Personnel do not attempt to manually pull over elevated trees, mechanical equipment used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
79. Springpoles cut safely, avoiding springback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80. Small-size brush and saplings cut with hand saws or other cutting tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
82. Cuts made with operator standing on the opposite side of the tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83. Operator keeping sight of saw tip, avoiding kickback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
84. Debris removed periodically to maintain clear vision and movement around tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BUCKING TREES (3.2.5)				
85. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86. Working from small end to larger to improve stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87. If tree on level ground, cutting from upper side and avoiding running chain into ground	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88. If tree supported at one end, cutting from lower side one-third, then upper side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89. If tree supported at both ends, cutting from upper side one-third, then lower side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to drilling hazards, 2) CH2M HILL staff are providing support function related to drilling activities, and/or 3) CH2M HILL oversight of a drilling subcontractor is required.

Safety Coordinator may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to drilling hazards (complete Section 1).
☐ Evaluate CH2M HILL support functions related to drilling activities (complete Section 2)
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling safety requirements (complete entire checklist).
 Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in SOP HSE-204.

SECTION 1 - SAFE WORK PRACTICES (4.1)

	Yes	No	N/A	N/O
1. Personnel cleared during rig startup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Personnel clear of rotating parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel not positioned under hoisted loads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Loose clothing and jewelry removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Smoking is prohibited around drilling operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel wearing appropriate personal protective equipment (PPE), per written plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Personnel instructed not to approach equipment that has become electrically energized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2 - SUPPORT FUNCTIONS (4.2)

FORMS/PERMITS (4.2.1)

8. Driller license/certification obtained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Well development/abandonment notifications and logs submitted and in project files	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Water withdrawal permit obtained, where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Dig permit obtained, where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

UTILITY LOCATING (4.2.2)

12. Location of underground utilities and structures identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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SECTION 2 (Continued)

WASTE MANAGEMENT (4.2.3)

13. Drill cuttings and purge water managed and disposed properly

Yes	No	N/A	N/O
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILLING AT HAZARDOUS WASTE SITES (4.2.4)

14. Waste disposed of according to project's written safety plan
 15. Appropriate decontamination procedures being followed, per project's written safety plan

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILLING AT MUNITIONS RESPONSE (4.2.5)

16. MEC plan prepared and approved
 17. MEC avoidance provided, routes and boundaries cleared and marked
 18. Initial pilot hole established by UXO technician with hand auger
 19. Personnel remain inside cleared areas

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 3 - DRILLING SAFETY REQUIREMENTS (4.3)

GENERAL (4.3.1)

20. Only authorized personnel operating drill rigs
 21. Daily safety briefing/meeting conducted with crew
 22. Daily inspection of drill rig and equipment conducted before use
 23. Manufacturer equipment inspections current and paperwork available?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILL RIG PLACEMENT (4.3.2)

24. Location of underground utilities and structures identified
 25. Safe clearance distance maintained from overhead power lines
 26. Drilling pad established, when necessary
 27. Drill rig leveled and stabilized
 28. Additional precautions taken when drilling in confined areas

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILL RIG TRAVEL (4.3.3)

29. Rig shut down and mast lowered and secured prior to rig movement
 30. Tools and equipment secured prior to rig movement
 31. Only personnel seated in cab are riding on rig during movement
 32. Safe clearance distance maintained while traveling under overhead power lines
 33. Backup alarm or spotter used when backing rig

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILL RIG OPERATION (4.3.4)

34. Kill switch clearly identified and operational
 35. All machine guards are in place
 36. Rig ropes not wrapped around body parts
 37. Pressurized lines and hoses secured from whipping hazards
 38. Drill operation stopped during inclement weather
 39. Air monitoring conducted per written safety plan for hazardous atmospheres
 40. Rig placed in neutral when operator not at controls

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILL RIG SITE CLOSURE (4.3.5)

41. Ground openings/holes filled or barricaded
 42. Equipment and tools properly stored
 43. All vehicles locked and keys removed

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DRILL RIG MAINTENANCE (4.3.6)

44. Defective components repaired immediately
 45. Lockout/tagout procedures used prior to maintenance
 46. Cathead in clean, sound condition
 47. Drill rig ropes in clean, sound condition
 48. Fall protection used for fall exposures of 6 feet (U.S.) 1.5 meters (Australia) or greater
 49. Rig in neutral and augers stopped rotating before cleaning
 50. Good housekeeping maintained on and around rig

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

Auditor: _____ Project Manager: _____

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to the hazards of earthmoving equipment operations, 2) CH2M HILL employees are operating earthmoving equipment, and/or 3) CH2M HILL provides oversight of a subcontractor operating earthmoving equipment.

The CH2M HILL Safety Coordinator may consult with subcontractors operating earthmoving equipment when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards (complete Section 1).
- ☐ Evaluate CH2M HILL employees operating earthmoving equipment (complete entire checklist).
- ☐ Evaluate CH2M HILL subcontractor's compliance with earthmoving equipment safety requirements (complete entire checklist). Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-306.

SAFE WORK PRACTICES (3.1)**SECTION 1****Yes No N/A N/O**

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel maintaining safe distance from operating equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Positioning personnel in close proximity to operating equipment is avoided | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Personnel wearing high-visibility and/or reflective vests when close to operating equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Personnel approach operating equipment safely | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Personnel riding only in seats of equipment cab and using seat belts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel not positioned under elevated portions of equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel not positioned under hoisted loads | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Personnel not hoisted by equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Personnel do not to approach equipment that has become electrically energized | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Personnel wearing appropriate PPE, per HSP/FSI | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

EQUIPMENT SAFETY REQUIREMENTS PRIOR TO OPERATING EQUIPMENT (3.2.1)	SECTION 2	Yes	No	N/A	N/O
11. Only qualified and authorized personnel operating equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Daily safety briefing/meeting conducted with equipment operators		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Daily inspection of equipment conducted and documented		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Modifications and attachments used approved by equipment manufacturer		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Backup alarm or spotter used when backing equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Operational horn provided on bi-directional equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Seat belts are provided and used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Rollover protective structures (ROPS) provided		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Braking system capable of stopping full payload		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Headlights and taillights operable when additional light required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Brake lights in operable condition		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Cab glass provides no visible distortion to the operator		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. All machine guards are in place		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Hauling equipment (dump trucks) provided with cab shield or canopy		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Dump truck beds provided with positive means of support during maintenance or inspection		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Dump truck operating levers provided with latch to prevent accidental dumping		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Air monitoring conducted per HSP/FSI for hazardous atmospheres		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT PLACEMENT (3.2.2)					
28. Equipment position on firm/level surface, outriggers used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Location of underground utilities identified		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Safe clearance distance maintained while working under overhead power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Safe distance is maintained while traveling under power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Warning system used to remind operator of excavation edge		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Unattended equipment visibly marked at night		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Tools lowered/parking brake set when not in use, wheels chocked when parked on incline		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT OPERATION (3.2.3)					
35. Equipment operated on safe roadways and grades		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Equipment operated at safe speed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Operators maintain unobstructed view of travel path		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Equipment not operated during inclement weather, lightning storms		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Equipment started and moved safely		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Operators keep body parts inside cab during operation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Vehicle occupants in safe position while loading/unloading		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Signal person visible to operator when required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Equipment used for hoisting done according to equipment manufacturer specifications		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Lifting and hauling capacities are not exceeded		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT MAINTENANCE (3.2.4)					
45. Defective components repaired immediately		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Suspended equipment or attachments supported prior to work under or between		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Lockout/tagout procedures used prior to maintenance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Tires on split rims removed using safety tire rack or cage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Good housekeeping maintained on and around equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATING AT HAZARDOUS WASTE SITES (3.2.5)					
50. Waste disposed of according to HSP/FSI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Appropriate decontamination procedures being followed, per HSP/FSI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

Auditor: _____ Project Manager: _____

HSE-306 A5, VERSION 1

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HS&E Self-Assessment Checklist—Excavations

This checklist shall be used by CH2M HILL personnel only and shall be completed at the frequency specified in the project's Health and Safety Plan/Field Safety Instruction (HSP/FSI).

This checklist is to be used at locations where: 1) CH2M HILL employees enter excavations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of an excavation subcontractor is required (complete entire checklist).

The SSC may consult with excavation subcontractors when completing this checklist, but shall not direct the means and methods of excavation operations nor direct the details of corrective actions. Excavation subcontractors shall determine how to correct deficiencies and we must rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until the situation is corrected.

Project Name: _____ Project No.: _____
 Location: _____ PM: _____
 Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to excavation hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with excavation HS&E requirements
 Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

	<u>SECTION 1</u>	<u>Yes</u>	<u>No</u>
	<u>N/A</u>	<u>N/O</u>	
EXCAVATION ENTRY REQUIREMENTS (4.1)			
1. Personnel have completed excavation safety training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Competent person has completed daily inspection and has authorized entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel are aware of entry requirements established by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Protective systems are free from damage and in stable condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Surface objects/structures secured from falling into excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Potential hazardous atmospheres have been tested and found to be at safe levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Precautions have been taken to prevent cave-in from water accumulation in the excavation	<input type="checkbox"/>	<input type="checkbox"/>
8. Personnel wearing appropriate, PPE per HSP/SI	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2		Yes	No
N/A		N/O	
GENERAL (4.2.1)			
9. Daily safety briefing/meeting conducted with personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Excavation and protective systems adequately inspected by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Defective protective systems or other unsafe conditions corrected before entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Guardrails provided on walkways over excavation 6 ft (1.8m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Barriers provided at excavations 6 ft or deeper when excavation not readily visible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Barriers or covers provided for wells, pits, shafts, or similar excavation 6 ft (1.8 m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Earthmoving equipment operated safely (use earthmoving equipment checklist in HSE-306)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PRIOR TO EXCAVATING (4.2.2)			
16. Dig Permit obtained where required by client/facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Location of underground utilities and installations identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATING ACTIVITIES (4.2.3)			
26. Rocks, trees, and other unstable surface objects removed or supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Exposed underground utility lines supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Undermined surface structures supported or determined to be in safe condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Warning system used to remind equipment operators of excavation edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATION ENTRY (4.2.4)			
32. Trenches > 4 ft (1.2 m) deep provided with safe means of egress within 25 ft (7.6 m)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Structure ramps designed and approved by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Potential hazardous atmospheres tested prior to entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Rescue equipment provided where potential for hazardous atmosphere exists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Ventilation used to control hazardous atmosphere and air tested frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

37. Appropriate respiratory protection used when ventilation does not control hazards	<input type="checkbox"/>	<input type="checkbox"/>
38. Precautions taken to prevent cave-in resulting from water accumulation in excavation	<input type="checkbox"/>	<input type="checkbox"/>
39. Precautions taken to prevent surface water from entering excavation	<input type="checkbox"/>	<input type="checkbox"/>
40. Protection provided from falling/rolling material originating from excavation face	<input type="checkbox"/>	<input type="checkbox"/>
41. Spoil piles, equipment, materials restrained or kept at least 2 ft (61 cm) from excavation edge	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATION PROTECTIVE SYSTEMS (4.2.5)		
42. Protective systems used for excavations 5 ft (1.5 m) or deeper, unless in stable rock	<input type="checkbox"/>	<input type="checkbox"/>
43. Protective systems for excavation deeper than 20 ft (6.1 m) designed by registered PE	<input type="checkbox"/>	<input type="checkbox"/>
44. If soil unclassified, maximum allowable slope is 34 degrees	<input type="checkbox"/>	<input type="checkbox"/>
45. Protective systems free from damage	<input type="checkbox"/>	<input type="checkbox"/>
46. Protective system used according to manufacturer's recommendations and not subjected to loads exceeding design limits	<input type="checkbox"/>	<input type="checkbox"/>
47. Protective system components securely connected to prevent movement or failure	<input type="checkbox"/>	<input type="checkbox"/>
48. Cave-in protection provided while entering/exiting shielding systems	<input type="checkbox"/>	<input type="checkbox"/>
49. Personnel removed from shielding systems when installed, removed, or if vertical movement	<input type="checkbox"/>	<input type="checkbox"/>

<u>N/A</u>	<u>Yes</u> <u>N/O</u>	<u>No</u>
PROTECTIVE SYSTEM REMOVAL AND BACKFILLING (4.2.6)		
50. Protective system removal starts and progresses from excavation bottom	<input type="checkbox"/>	<input type="checkbox"/>
51. Protective systems removed slowly and cautiously	<input type="checkbox"/>	<input type="checkbox"/>
52. Temporary structure supports used if failure of remaining components observed	<input type="checkbox"/>	<input type="checkbox"/>
53. Backfilling takes place immediately after protective system removal	<input type="checkbox"/>	<input type="checkbox"/>

CH2MHILL

HSE Self-Assessment Checklist—HAND AND POWER TOOLS

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are exposed to hand and power tool hazards and/or (2) CH2M HILL provides oversight of subcontractor personnel who are exposed to hand and power tool hazards.

SC may consult with subcontractors when completing this checklist, but shall not direct the means and methods of hand and power tool use nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposure to hand and power tool hazards.
☐ Evaluate a CH2M HILL subcontractor's compliance with hand and power tool requirements.
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-210.

SECTION 1

SAFE WORK PRACTICES (5.1)

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
1. All tools operated according to manufacturer's instructions and design limitations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. All hand and power tools maintained in a safe condition and inspected and tested before use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Defective tools are tagged and removed from service until repaired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. PPE is selected and used according to tool-specific hazards anticipated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Power tools are not carried or lowered by their cord or hose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Tools are disconnected from energy sources when not in use, servicing, cleaning, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Safety guards remain installed or are promptly replaced after repair.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Tools are stored properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Cordless tools and recharging units both conform to electrical standards and specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Tools used in explosive environments are rated for such use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Knife or blade hand tools are used with the proper precautions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stressors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CH2MHILL**HSE Self-Assessment Checklist—HAND AND POWER TOOLS****SECTION 2****Yes No N/A N/O****GENERAL (5.2.2)**

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 13. PPE is selected and used according to tool-specific hazards anticipated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Tools are tested daily to assure safety devices are operating properly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Damaged tools are removed from service until repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Power operated tools designed to accommodate guards have guards installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Rotating or moving parts on tools are properly guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Machines designed for fixed locations are secured or anchored. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Floor and bench-mounted grinders are provided with properly positioned work rests. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Guards are provided at point of operation, nip points, rotating parts, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Fluid used in hydraulic-powered tools is approved fire-resistant fluid. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ELECTRIC-POWERED TOOLS (5.2.3)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 22. Electric tools are approved double insulated or grounded and used according to SOP HSE-206. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Electric cords are not used for hoisting or lowering tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Electric tools are used in damp/ wet locations are approved for such locations or GFCI installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Hand-held tools are equipped with appropriate on/off controls appropriate for the tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Portable, power-driven circular saws are equipped with proper guards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ABRASIVE WHEEL TOOLS (5.2.4)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 27. All employees using abrasive wheel tools are wearing eye protection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. All grinding machines are supplied with sufficient power to maintain spindle speed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Abrasive wheels are closely inspected and ring-tested before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Grinding wheels are properly installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Cup-type wheels for external grinding are protected by the proper guard or flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Portable abrasive wheels used for internal grinding are protected by safety flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Safety flanges are used only with wheels designed to fit the flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Safety guards on abrasive wheel tools are mounted properly and of sufficient strength. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PNEUMATIC-POWERED TOOLS (5.2.5)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 35. Tools are secured to hoses or whip by positive means to prevent disconnection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Safety clips or retainers are installed to prevent attachments being expelled. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Safety devices are installed on automatic fastener feed tools as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Compressed air is not used for cleaning unless reduced to < 30 psi, with PPE, and guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Manufacturer's safe operating pressure for hoses, pipes, valves, etc. are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Hoses are not used for hoisting or lowering tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. All hoses >1/2-inch diameter have safety device at source to reduce pressure upon hose failure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Airless spray guns have required safety devices installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Blast cleaning nozzles are equipped with operating valves, which are held open manually. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Supports are provided for mounting nozzles when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Air receiver drains, handholes, and manholes are easily accessible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Air receivers are equipped with drainpipes and valves for removal of accumulated oil and water. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Air receivers are completely drained at required intervals. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Air receivers are equipped with indicating pressure gauges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Safety, indicating, and controlling devices are installed as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Safety valves are tested frequently and at regular intervals to assure good operating condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 2 (continued)**Yes No N/A N/O****LIQUID FUEL-POWERED TOOLS (5.2.6)**

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 51. Liquid fuel-powered tools are stopped when refueling, servicing, or maintaining. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Liquid fuels are stored, handled, and transported in accordance with SOP HSE-403 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Liquid fuel-powered tools are used in confined spaces in accordance with SOP HSE-203. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Safe operating pressures of hoses, valves, pipes, filters, and other fittings are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

POWDER-ACTUATED TOOLS (5.2.7)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 55. Only trained employee operates powder-actuated tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Powder-actuated tools are not loaded until just prior to intended firing time. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Tools are not pointed at any employee at any time. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Hands are kept clear of open barrel end. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Loaded tools are not left unattended. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Fasteners are not driven into very hard or brittle materials. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Fasteners are not driven into easily penetrated materials unless suitable backing is provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Fasteners are not driven into spalled areas. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Powder-actuated tools are not used in an explosive or flammable atmosphere. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. All tools are used with correct shields, guards, or attachments recommended by manufacturer. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

JACKING TOOLS (5.2.8)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 65. Rated capacities are legibly marked on jacks and not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Jacks have a positive stop to prevent over-travel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. The base of jacks are blocked or cribbed to provide a firm foundation, when required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Wood blocks are placed between the cap and load to prevent slippage, when required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. After load is raised, it is cribbed, blocked, or otherwise secured immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. Antifreeze is used when hydraulic jacks are exposed to freezing temperatures. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. All jacks are properly lubricated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. Jacks are inspected as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. Repair or replacement parts are examined for possible defects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 74. Jacks not working properly are removed from service and repaired or replaced. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

HAND TOOLS (5.2.9)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 75. Wrenches are not used when jaws are sprung to the point of slippage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 76. Impact tools are kept free of mushroomed heads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 77. Wooden handles of tools are kept free of splinters or cracks and are tightly fitted in tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

CHAIN SAWS (5.2.10)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| | Yes | No | N/A | N/O |
| 78. Chainsaw equipped with spark arrestor and fully functioning chain brake | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 79. Chainsaw operator's manual readily available | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 80. Fully stocked first aid kit and multipurpose fire extinguisher available | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 81. Appropriate personal protective equipment available and worn | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 82. Clothing free of loose edges that could become entangled in the saw | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 83. Chainsaw handles kept dry, clean, and free of oil or fuel mixture | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 84. Chainsaws held firmly with both hands and used right-handed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 85. Operator standing to the left of the saw out of the plane of the chain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 86. Saw used between the waist and mid-chest level | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 87. Full throttle maintained while cutting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 88. Operator aware of position of guide bar tip, does not contact tip with anything being cut | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 89. Bumper spikes maintained as close to the object as possible | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 90. Operator aware of what is in the saw's downward path after the cut | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 91. No attempt to made to cut material that is larger than the guide bar of the saw | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 92. Cuts avoided that will cause chain to jam | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 93. Non-metallic wedges used to prevent compression cuts from jamming the blade | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 94. Bystanders and helpers kept at a safe distance from operation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 95. Chainsaw not operated when fatigued | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 96. Fire extinguisher present when operating the chainsaw in forest or brushy areas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

HS&E Self-Assessment Checklist: HAZARDOUS MATERIALS

Page 1 of 6

This checklist is provided as a method of verifying compliance with regulations pertaining to the handling of hazardous materials. It shall be used at locations where CH2M HILL employees handle hazardous materials, or are required to perform oversight of subcontractor personnel handling hazardous materials, or both.

CH2M HILL staff shall not direct the means and methods of subcontractor operations nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies, and CH2M HILL staff must carefully rely on the subcontractor's expertise. Items considered imminently dangerous (possibility of serious injury or death) must be corrected immediately, or all exposed personnel must be removed from the hazard until it is corrected.

Completed checklists must be sent to the appropriate regional health and safety program manager for review.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

- ☐ Evaluate CH2M HILL compliance with hazardous material handling requirements (SOP HSE-403)
☐ Evaluate a CH2M HILL subcontractor's compliance with hazardous material requirements
Subcontractor's Name: _____

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-403.

SECTION 1**Yes No N/A N/O****PROCEDURES FOR HAZARDOUS MATERIAL HANDLING (6.0)****GENERAL GUIDELINES (6.1)**

1. Acids are stored away from bases.
2. Oxidizers and organics are stored away from inorganic reducing agents.
3. Flammables and corrosives are stored in appropriate storage cabinets.
4. Paper and other combustibles are not stored near flammables.
5. Secondary containment and lipped shelving are in place in storage areas.
6. A fire suppression system is available.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SPILL CONTROL/CLEANUP (6.2)

7. Spill control materials are located on the project site.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------

HAZARDOUS CHEMICAL INVENTORY REPORTING (6.3)

8. Reporting is required if the project site handles and stores 10,000 lb or more of a hazardous chemical.
9. Or 500 lb or the threshold planning quantity (TPQ) of an extremely hazardous substance.
10. Regional ECC has been consulted for hazardous chemical inventory reporting.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TOXIC CHEMICAL RELEASE REPORTING

11. Reporting requirements for toxic chemical release reporting have been followed.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------

SECTION 1 (continued)		Yes	No	N/A	N/O
FLAMMABLE AND COMBUSTIBLE LIQUIDS (6.5)					
GENERAL STORAGE (6.5.1)					
12. Only approved containers/portable tanks used to store flammable and combustible liquids.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Approved safety cans used for handling flammable liquids in quantities 1-5 gallons.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. For quantities of one gallon or less, the original container must be used for storage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Flammable or combustible liquids are not stored in stairways or personnel passageways.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INDOOR STORAGE (6.5.2)					
16. Quantities of flammable or combustible liquids > 25 gallons stored in approved storage cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. No more than 25 gallons of flamm. or comb. liquids can be stored outside an approved cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Cabinets are labeled with "FLAMMABLE: KEEP FIRE AWAY."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. No more than 60 gallons of flamm. or 120 gallons of comb. liquids stored in one storage cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Not more than three cabinets located in a single storage area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OUTSIDE STORAGE (6.5.3)					
21. Storage of containers (not more than 60 gallons each) do not exceed 1,100 gallons in any area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Storage areas are not within 20 feet of any building.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Storage areas graded to divert spills away from buildings and surrounded by an earth dike.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Storage areas are free from weeds, debris, and other combustible materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Outdoor portable tanks are provided with emergency vent devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Outdoor portable tanks are no closer than 20 feet from any building.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Signs indicating no smoking are posted around the storage area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DISPENSING (6.5.4)					
28. Areas where liquids are dispensed in >5-gal quantities are separated from other operations by 25'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Drainage or other means provided to control spills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Adequate natural or mechanical ventilation provided to maintain concentration of flammable vapor < 10% of the lower flammable limit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Dispensing of flammable liquids from one container to another is done only when containers are electrically interconnected (bonded).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks prohibited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Dispensing devices and nozzles for flammable liquids are of an approved type.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USE (6.5.5)					
34. Flammable liquids are kept in closed containers when not in actual use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Leakage or spillage of flammable or combustible liquids is disposed of promptly and safely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Sources of ignition are kept at least 50 feet from flammable liquids.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LIQUID PETROLEUM GAS (6.6)					
37. LPG containers meet DOT requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Each container or system has a safety relief device or valve in good working order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Portable heaters using LPG have an automatic shutoff device in the event of flame failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Storage of LPG within buildings is prohibited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. LPG storage location has at least one portable fire extinguisher rated not less than 20-B:C.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 1 (continued)		Yes	No	N/A	N/O
COMPRESSED GAS CYLINDERS (6.7)					
GENERAL (6.7.1)					
42. Cylinders and apparatus inspected for defects and leakage prior to use. Damaged items not used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
43. Gas distributor notified and subsequent instructions followed for defective cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
44. Leaking cylinders removed from the work area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
45. Cylinder users do not modify, tamper, or attempt repair on cylinders or apparatus.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
46. Only cylinder owners or authorized agent refill cylinders or attempt to mix gases in a cylinder.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
47. Cylinders labeled with the identity of the contents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
TRANSPORTING (6.7.2)					
48. Cylinders not rolled in the horizontal position or dragged; suitable material-handling device used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
49. Cylinders being transported have valve protection caps installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
50. Cylinders in vertical position when transported by motor vehicle, hoisted, or carried.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
51. Cylinders hoisted by a cradle or pallet designed for such use, and not by magnets, slings, or their valve protection caps.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
STORAGE (6.7.3)					
52. Cylinders are stored in the vertical position with valve protection caps installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
53. Cylinders are secured from being knocked over by a chain or other stabilizing device.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
54. Cylinders are stored away from readily ignitable substances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
55. Cylinders are protected from exposure to temperature extremes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
56. Oxygen cylinders in storage are separated from fuel gas cylinders or combustible materials > 20' or by a ½-hour fire-resistant barrier at least 5' high.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
57. Cylinders inside buildings are stored in dry, well-ventilated locations > 20' from comb. materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
58. Cylinders are stored in definitely assigned places away from elevators, stairs, or gangways.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
59. Signs indicating no smoking are provided for storage areas containing flammable gas cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PLACEMENT FOR USAGE (6.7.4)					
60. Cylinders are located where they will not be knocked over or damaged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
61. Cylinders are secured in the vertical position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
62. Cylinders are not placed where they can become part of an electrical circuit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
63. Cylinders are kept far enough away from welding and cutting operations to prevent sparks, hot slag, or flames from reaching them. When impractical, fire resistant shields are provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
64. Cylinders are not taken into confined spaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
CYLINDER CONNECTIONS (6.7.5)					
65. Pressure-controlling apparatus is compatible with the particular gas used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
66. Cylinders and pressure-controlling apparatus are kept free of oil and grease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
67. Pressure-controlling apparatus is kept gastight to prevent leakage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
68. Cylinders not attached to process where backflow could occur unless check valves or traps used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
69. Manifolds designed for product used at the appropriate temperatures, pressures, and flow rates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
70. Manifolds are labeled and placed in well-ventilated and accessible locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
71. Cylinders are not cross-connected with plant air lines.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
72. Flash arrestors or reverse flow check valves are installed on all flammable gas cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
USAGE (6.7.6)					
73. Eye protection (safety glasses or goggles) is worn when using cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
74. Cylinder valve and regulator are inspected for foreign material before connecting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
75. If cylinders are frozen, warm (not boiling) water is used to thaw cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
76. Cylinder valve remains closed except when the cylinder is in use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
77. Fuel gas cylinder valves are not opened more than 1½ turns, for quick closing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
78. If a special wrench is used to open a cylinder valve, it is left in position on the valve.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

SECTION 1 (continued)		Yes	No	N/A	N/O
USAGE (continued) (6.7.6)					
79. Acetylene cylinders are used in the vertical position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80. Acetylene cylinders are not used > 15 psig or > 30 psia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81. Copper pipe or fittings are not used with acetylene systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
82. Compressed gas is not used to dust off clothing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
83. Cylinder valve closed and regulator relieved of internal pressure before regulators are removed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXPLOSIVES (6.8)					
84. Written authorization provided by Munitions Market Segment Leader designating individuals who can store or use high explosives under the authority of the CH2M HILL BATF Type 33 User of High Explosives License/permit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
85. Written authorization provided by Munitions Market Segment Leader designating individuals who can manufacture high explosives under the authority of the CH2M HILL BATF Type 20 Manufacturer of High Explosives License/permit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
86. Approved Explosive Siting Plan (ESP).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
87. Approved Explosive Management Plan (EMP).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
88. Sources of ignition are not brought in or near storage magazines, or within 50' of an area where explosives are being handled, transported, or used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89. Radio transmitting or receiving equipment is not brought within 1,000' of blasting activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
90. Transportation and storage of explosives comply with local, state, and federal regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
91. Vehicles transporting explosives are placarded and displayed according to DOT regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
92. Detonators or blasting caps are not stored with explosive charges.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
93. Explosives are stored in storage magazines as required by local, state, and federal regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94. Contact the Munitions Response market Segment Leader for additional instructions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROCEDURES FOR HAZARDOUS MATERIALS SHIPPING (7.0)					
1. Only dangerous goods shippers are permitted to ship dangerous goods (CH2M HILL only).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Dangerous goods are shipped or transported in accordance with CH2M HILL's procedures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. All personnel shipping dangerous goods have completed the computer-based training (CH2M HILL only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Dangerous goods are stored only in the equipment warehouse prior to shipping.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Written authorization provided by Munitions Market Segment Leader designating individuals who can "offer explosives for shipment" under the authority of the CH2M HILL Department of Transportation Hazardous Materials Certificate of Registration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SHIPPING BY AIR (7.1)					
5. Shipments for Federal Express meet IATA requirements for dangerous goods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Before shipping, packages are clearly identified, packed, marked, labeled, and documented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The quantity does not exceed IATA regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Packaging meets IATA requirements and withstand transport by air.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Shipper classifies each item into one of the 9 hazard classes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Inner packages are packed to prevent breaking or leaking during shipping.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Absorbent or cushioning material does not react with the contents of the inner package.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Outer packages in fiberboard, a plastic case, or other sturdy container.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Package is capable of withstanding 4' drop test with no damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Package is marked with: proper shipping name of contents, technical name, UN number, total net. quantity, and the name and address of the shipper and recipient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Irrelevant labels have been removed from package.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Hazard label and handling label are secured in correct locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Dangerous goods airbill has been completed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Dangerous goods are not shipped via UPS.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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SECTION 1 (continued)

SHIPPING BY HIGHWAY (7.2)

19. Use Federal Express packaging and paperwork requirements that comply with DOT regs for ground transportation of dangerous goods.
20. Consult with local state highway police if route includes vehicular tunnels.
21. Inner packaging prevents breakage or leakage under normal conditions of transport.
22. Absorbent/cushioning material does not react with contents of the package.
23. Labels for highway transportation are the same as those for air transportation.
24. Engine turned off, brake set during loading and unloading.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes	No	N/A	N/O

EMERGENCY RESPONSE (7.3)

25. Appropriate emergency response information available not on the package, within reach of driver.
26. Information includes copy of pages from *Emergency Response Guidebook* for each item.
27. An MSDS for each item must also be included.
28. Emergency response information must also include the information found on the shipping papers.
29. CH2M HILL's 24-hour EMERGENCY RESPONSE TELEPHONE NUMBER, (800) 255-3954, is included, as required.
30. In the event of an accident, keep other individuals, except response workers, from the vicinity.
31. In case of breakage, spillage, or leakage, use means to prevent spreading and contain the spill.
32. Care taken during the handling of cargo to minimize hazards.
33. MSDS is consulted for safe handling procedures.
34. Wash the area of the vehicle where the dangerous goods may have spilled.
35. Consult your supervisor in the event of a spill.
36. Ask your supervisor to call CHEM-TEL of the local HAZMAT unit if the spill poses a danger.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

[illegible]

Auditor: _____ **Project Manager:** _____

HSE-403 A1, VERSION 2

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CH2MHILL

HSE Self-Assessment Checklist—Lifting

This checklist shall be used **only** by CH2M HILL personnel and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees perform manual lifting activities (office or projects), and/or (2) CH2M HILL provides oversight of a subcontractor performing manual lifting activities. SC or Office Safety Coordinators/Committee members may consult with subcontractors (if applicable) when completing this checklist but shall not direct the means and methods of activities nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until corrected.

Complete the appropriate project or office information:

Project Information

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

Office Information

Office Location: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee manual lifting activities.
- ☐ Evaluate a CH2M HILL subcontractor's manual lifting activities.

Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor.
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-112.

Planning Activities

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
1. Efforts have been made to inquire about receiving equipment or supplies in containers weighting less than 50 pounds (23 kilograms).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Equipment or supplies are being delivered as close as possible to their use point.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Heavy equipment or supplies are being stored off the ground and no lower than knee height.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Adequate space has been provided to access and lift equipment or supplies without reaching or twisting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Safe Work Practices (5.1)

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
5. Tasks or activities have been modified to reduce or minimize manual lifting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. All employees performing manual lifting have received training on how to lift safely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Manual lifting control measures are evaluated during assessments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Manual lifting incidents are reviewed as part of the HSE Program reviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Manual lifting incidents are reviewed as part of the HSE Program reviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Office Environments (5.1.1)	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
10. Employees have received lifting training.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Mechanical devices are readily available to employees handling equipment or supplies weighing more than 40 pounds (18 kilograms).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Field Projects (5.1.2)	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
12. All manual lifting tasks or activities have been addressed in the written site safety plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Employees have received safe lifting training as required by the written site safety plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mechanical Lifting (5.2)	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
14. Hand trucks and trolleys are visually inspected before use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Hand trucks and trolleys do not have any broken or damaged parts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Hand truck and trolley paths are free of uneven surfaces, water, oil, or cracks and holes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Loads carried by hand trucks are balanced and sturdy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Hand trucks or dollies are being pushed when on level ground.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. When going up or down a slope using a hand truck or trolley, the load is downslope of the person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Employees using hand trucks or dollies are moving slowly and cautiously.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Employees using hand trucks or trolleys are able to see over the load.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assisted Lifting (5.3)	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
22. Personnel are not performing manual lifting beyond their physical capabilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Loads are evenly distributed when being handled by multiple people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual Lifting (5.4)	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
24. Before the lift, the load and path was assessed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Loads being lifted are free of sharp edges, slivers, or wet or greasy spots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Gloves are used for manual lifts of loads with sharp or splintered edges.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Employees performing manual lifts use the proper lifting techniques.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. Special tools fabricated for lifting grates or manhole covers are used.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

HS&E Self-Assessment Checklist—TRAFFIC CONTROL

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are exposed to traffic hazards and/or (2) CH2M HILL provides oversight of subcontractor personnel who are exposed to traffic hazards.

SC may consult with subcontractors when completing this checklist, but shall not direct the means and methods of traffic control operations nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Completed checklists shall be sent to the HS&E Staff for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposure to traffic hazards.
☐ Evaluate a CH2M HILL subcontractor's compliance with traffic control requirements.
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-216.

SECTION 1**SAFE WORK PRACTICES (3.1)****Yes No N/A N/O**

- | | Yes | No | N/A | N/O |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel working on/adjacent to active roadways or in control zones are wearing safety vests. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Traffic control plan (TCP) is consistent with roadway, traffic, and working conditions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. TCP has been approved by regulatory or contractual authority prior to work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. TCP considers all factors that may influence traffic related hazards and controls. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Work areas are protected by rigid barriers. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Lookouts are used when applicable. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Vehicles are parked 40 feet away from work zone or are equipped with hazard beacon/strobe. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. TMCC or TMA vehicle is used where appropriate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. All CH2M HILL traffic control devices conform to MUTCD standards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Traffic control devices are inspected continuously. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Flagging is only used when other means of traffic control are inadequate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Additional traffic control zone controls have been implemented. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Cranes do not swing loads/booms over nor do workers enter/cross live roadways (as defined). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

	Yes	No	N/A	N/O
SECTION 2				
GENERAL (3.2.1)				
14. Lane closings are performed when required by this SOP.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Traffic control configurations are based on an engineering study of the location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. If no study, traffic control is performed with approval of the authority having jurisdiction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. TCP has been prepared and understood by all responsible parties prior to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Special preparation/coordination with external parties has been conducted where applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. All contractor traffic control devices conform to MUTCD standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Traffic movement and flow are inhibited or disrupted as little as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Supplemental equipment and activities do not interfere with traffic.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Drivers and pedestrians are considered when entering and traversing traffic control zone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TRAFFIC CONTROL ZONES (3.2.2)				
23. Traffic control zones are divided into the necessary five areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Advances warning area is designed based on conditions of speed, roadways, and driver needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Advanced warning signage is spaced according to roadway type and conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Transition areas are used to channelize traffic around the work area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Buffer areas are used to provide a margin of safety for traffic and workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. The buffer area is free of equipment, workers, materials, and worker vehicles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. The length of the buffer area is two times the posted speed limit in feet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. All work is contained in the work area and is closed to all traffic.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. A termination area is used to provide traffic to return to normal lanes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. A downstream taper is installed in the termination area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DEVICE INSTALLATION AND REMOVAL (3.2.3)				
33. All vehicles involved with device installation/removal have hazard beacons/strobes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Devices are installed according to the order established by this SOP.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Devices are removed in the opposite order of installation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Tapers are used to move traffic out of its normal path.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Tapers are created using channelizing devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. The length of taper is determined by posted speed and width of lane to be closed (see formula).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Local police or highway patrol assist during taper installation and removal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. TMCC/ TMA vehicles are used to protect personnel during installation and removal of devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Cone trucks are equipped with platforms and railings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Cones are the appropriate height for the specific roadway and are reflectorized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Temporary sign supports are secured using sandbags to prevent movement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Arrow panels are used on lane closures where required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Concrete barriers are used where required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Barrels, crash cushions, or energy absorbing terminals are used to protect traffic as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Changeable message signs (CMS) are used as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. CMS are not used to replace required signage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. No more than two message panels are used in any message cycle on CMS.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FLAGGING (3.2.4)				
50. Flagging is used only when other traffic control methods are inadequate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Only approved personnel with current certification are allowed to be used as flaggers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Flaggers are located off the traveled portion of the roadway.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. A communication system is established when more than one flagger is used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Hand signaling by flaggers is by means of red flags, sign paddles, or red lights.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Flaggers are alert, positioned close enough to warn work crews, and easily identified from crew.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. An escape plan is established by crew and flaggers prior to traffic control set up.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Signs indicating a flagger is present are used and removed as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2**Yes No N/A N/O****INSPECTION AND MAINTENANCE (3.2.5)**

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 58. Traffic control zones are monitored to determine their effectiveness under varying conditions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Traffic control devices are inspected at the beginning and continuously during work shift. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Traffic control devices are restored to their proper position immediately and continuously. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Damaged, old, or ineffective devices are removed and replace immediately and continuously. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Devices using reflected light for illumination are cleaned and monitored continuously. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

[illegible]

Auditor: _____ Project Manager: _____

CH2MHILL

HS&E Self-Assessment Checklist -Vinyl Chloride

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to vinyl chloride, or are required to perform oversight of a subcontractor whose personnel are exposed to vinyl chloride.

CH2M HILL staff shall not direct the means and methods of subcontractor vinyl chloride activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____	Project No.: _____
Location: _____	PM: _____
Auditor: _____	Title: _____ Date: _____
This specific checklist has been completed to:	
<input type="checkbox"/> Evaluate CH2M HILL compliance with its Vinyl Chloride program (SOP HSE-512)	
<input type="checkbox"/> Evaluate a CH2M HILL subcontractor's compliance with its Vinyl Chloride program	
Subcontractors Name: _____	

- Check "Yes" if an assessment item is complete/correct
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable
- Check "N/O" if an item is applicable but was not observed during the assessment

<u>SECTION 1</u>		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
PERSONNEL SAFE WORK PRACTICES (5.1)					
COMPLIANCE PROGRAM (5.1.1)					
1.	A written compliance program is established for work above the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	The compliance program includes means of maintaining exposures below the PEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	The compliance program is based on the most recent air monitoring results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Written compliance program is available to all affected employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Waste generated must be determined if considered hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EMPLOYEE INFORMATION (5.1.2)					
6.	CH2M HILL personnel have completed the Vinyl Chloride Training Module.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	The selection of the appropriate respirator is based on the airborne vinyl concentration.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Written or verbal notification to owners, contractors or other personnel working in the area of vinyl chloride work activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Storage, waste or shipping containers have been properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
REGULATED AREAS (5.1.3)				
11. Areas that exceed the PELs (TWA or STEL) have been designated as regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Personnel do not enter regulated areas unless they meet training, medical and PPE requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Warning signs have been posted at all entrances to the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exposure Assessment (5.2)				
14. Initial air monitoring (TWA & STEL) conducted over full shift for each job classification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Air monitoring has been repeated when a change in production or controls occurred.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Personnel exhibiting signs of exposure have been monitored.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. EL > AL have been resampled in the last 6 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. EL ≥ PEL have been resampled in the 3 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Air monitoring results above the STEL have been resampled according to frequency established by RHSM.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Employees are given opportunities to observe monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Relevant employees are notified within 15 days in writing of the results of monitoring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL METHODS (5.3)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)				
22. Engineering controls and work practices are implemented to reduce exposures to below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Engineering and work practices are implemented to achieve the lowest feasible exposures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Employees are not allowed to eat, drink or smoke in regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Action plans have been developed to respond to spills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Employees responding to spills have been trained and supplied with PPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Vinyl chloride-contaminated waste is properly handled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATORY PROTECTION (5.3.2)				
28. Respirators are used in areas where EL ≥ PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. A written respiratory protection program is in place where respirators are used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Cartridges changed based on change schedule or at the beginning of each shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Protective Equipment (5.3.3)				
31. PPE is provided by the employer at no cost to employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. PPE is selected based on the materials, conditions, and hazards present.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. PPE is provided clean and dry for each use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Personnel who clean or launder protective clothing are informed in writing of the hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

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ACTIVITY HAZARD ANALYSIS

CH2M HILL Health and Safety Plan

Attachment 5

Key Target Zero Program Elements

(blank forms for field use)

Activity Hazard Analysis

Pre-Task Safety Plans

Safe Behavior Observation

Incident Report and Investigation

(use electronic form when possible)

[HITS](#)

Lessons Learned Template

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	

Activity:	Date:
	Project Name:
Description of the work:	Site Supervisor:
	Site Safety Officer:
	Review for latest use: Before the job is performed

[illegible]

ACTIVITY HAZARD ANALYSIS

Work Activity Sequence (Identify the principal steps involved and the sequence of work activities)	Potential Health and Safety Hazards (Analyze each principal step for potential hazards)	Hazard Controls (Develop specific controls for each potential hazard)

Equipment to be used (List equipment to be used in the work activity)	Inspection Requirements (List inspection requirements for the work activity)	Training Requirements (List training requirements including hazard communication)

ACTIVITY HAZARD ANALYSIS

PRINT NAME

SIGNATURE

Supervisor Name: _____

Date/Time: _____

Safety Officer Name: _____

Date/Time: _____

Employee Name(s): _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

Date/Time: _____

**CH2MHILL****DAILY SAFETY MEETING SIGN-IN SHEET**

Date: _____ Project Name/Location: _____
Company: _____ Person Conducting Briefing: _____

1. AWARENESS (e.g., special HSE concerns, observations from yesterday, recent incidents, etc.):

2. OTHER ISSUES (HASP changes, new AHAs, attendee comments, etc.):

3. DISCUSSION OF DAILY ACTIVITIES/TASKS AND SAFETY MEASURES TO BE USED:

4. ATTENDEES (Print Name):

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.
17.	18.

PRE-TASK SAFETY PLAN

Project: _____ Location: _____ Date: _____

Supervisor: _____ Job Activity: _____

Task Personnel:

List Tasks:

Tools/Equipment required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (Check all that apply):

<input type="checkbox"/> Chemical burns/contact	<input type="checkbox"/> Trench, excavations, cave-ins	<input type="checkbox"/> Ergonomics
<input type="checkbox"/> Pressurized lines/equipment	<input type="checkbox"/> Overexertion	<input type="checkbox"/> Chemical splash
<input type="checkbox"/> Thermal burns	<input type="checkbox"/> Pinch points	<input type="checkbox"/> Poisonous plants/insects
<input type="checkbox"/> Electrical	<input type="checkbox"/> Cuts/abrasions	<input type="checkbox"/> Eye hazards/flying projectile
<input type="checkbox"/> Weather conditions	<input type="checkbox"/> Spills	<input type="checkbox"/> Inhalation hazard
<input type="checkbox"/> Heights/fall > 6'	<input type="checkbox"/> Overhead Electrical hazards	<input type="checkbox"/> Heat/cold stress
<input type="checkbox"/> Noise	<input type="checkbox"/> Elevated loads	<input type="checkbox"/> Water/drowning hazard
<input type="checkbox"/> Explosion/fire	<input type="checkbox"/> Slips, trip and falls	<input type="checkbox"/> Heavy equipment
<input type="checkbox"/> Radiation	<input type="checkbox"/> Manual lifting	<input type="checkbox"/> Aerial lifts/platforms
<input type="checkbox"/> Confined space entry	<input type="checkbox"/> Welding/cutting	<input type="checkbox"/> Demolition

Other Potential Hazards (Describe):

CH2MHILL**PRE-TASK SAFETY PLAN**

Hazard Control Measures (Check all that apply):

PPE __ Thermal/lined __ Eye __ Dermal/hand __ Hearing __ Respiratory __ Reflective vests __ Flotation device	Protective Systems __ Sloping __ Shoring __ Trench box __ Barricades __ Competent person __ Locate buried utilities __ Daily inspections	Fire Protection __ Fire extinguishers __ Fire watch __ Non-spark tools __ Grounding/bonding __ Intrinsically safe equipment	Electrical __ Lockout/tagout __ Grounded __ Panels covered __ GFCI/extension cords __ Power tools/cord inspected
Fall Protection __ Harness/lanyards __ Adequate anchorage __ Guardrail system __ Covered opening __ Fixed barricades __ Warning system	Air Monitoring __ PID/FID __ Detector tubes __ Radiation __ Personnel sampling __ LEL/O2 __ Other	Proper Equipment __ Aerial lift/ladders/scaffolds __ Forklift/ Heavy equipment __ Backup alarms __ Hand/power tools __ Crane w/current inspection __ Proper rigging __ Operator qualified	Welding & Cutting __ Cylinders secured/capped __ Cylinders separated/upright __ Flash-back arrestors __ No cylinders in CSE __ Flame retardant clothing __ Appropriate goggles
Confined Space Entry __ Isolation __ Air monitoring __ Trained personnel __ Permit completed __ Rescue	Medical/ER __ First-aid kit __ Eye wash __ FA-CPR trained personnel __ Route to hospital	Heat/Cold Stress __ Work/rest regime __ Rest area __ Liquids available __ Monitoring __ Training	Vehicle/Traffic __ Traffic control __ Barricades __ Flags __ Signs
Permits __ Hot work __ Confined space __ Lockout/tagout __ Excavation __ Demolition __ Energized work	Demolition __ Pre-demolition survey __ Structure condition __ Isolate area/utilities __ Competent person __ Hazmat present	Inspections: __ Ladders/aerial lifts __ Lanyards/harness __ Scaffolds __ Heavy equipment __ Cranes and rigging	Training: __ Hazwaste __ Construction __ Competent person __ Task-specific (THA) __ Hazcom

FieldNotes:

Supervisor signature: _____

Date: _____

Safe Behavior Observation Form☐ Federal or ☐ Commercial Sector (check one)☐ Construction or ☐ Consulting (check one)

Project Number:

Client/Program:

Project Name:

Observer:

Date:

Position/Title of
worker observed:Background Information/
comments:Task/Observation
Observed:

- ❖ Identify and reinforce safe work practices/behaviors
- ❖ Identify and improve on at-risk practices/acts
- ❖ Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- ❖ Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- ❖ Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			Positive Observations/Safe Work Practices:
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			Questionable Activity/Unsafe Condition Observed:
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			Observer's Corrective Actions/Comments:
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			Observed Worker's Corrective Actions/Comments:
Repetitive motion			
Other...			

For ES Federal Sector projects please email completed forms to: CH2M HILL ES FED Safe Behavior ObservationFor ES Commercial Sector projects please email completed forms to: CH2M HILL ES COM Safe Behavior ObservationFor CNR ES staff please email completed forms to: cnressafe@ch2m.com

HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

Phase 1 – Initial Entry

Type of Incident (May select more than one)

- | | | |
|--|---|------------------------------------|
| <input type="checkbox"/> Injury/Illness | <input type="checkbox"/> Spill/Release | <input type="checkbox"/> Near Miss |
| <input type="checkbox"/> Property Damage | <input type="checkbox"/> Environment/Permit | <input type="checkbox"/> Other |

General Information Section

Preparer's Name: _____ Preparer's Phone Number: _____

Date of Incident: _____ Time of Incident: _____ AM / PM

What Business Group is accountable for this incident: _____

What Business Group SubGroup is accountable for this incident: _____

What CH2M HILL Company is accountable for this incident: _____

Where did the Incident occur?

- ☐ United States, Geographic Region: _____
- ☐ Canada, Province/Territory: _____
- ☐ International, County: _____

Location of Incident?

- ☐ Company Premises, CH2M HILL Office (use 3 letter office code if available): _____
- ☐ Project, Project name: _____
- ☐ In Transit
- Traveling from: _____
- Traveling to: _____
- ☐ At Home
- ☐ Other, Specify: _____

Describe the incident: _____

Describe how this event could have been prevented: _____

Provide Witness Information:

Name: _____	Phone: _____
Name: _____	Phone: _____
Name: _____	Phone: _____

Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel:

Client Personnel:

Additional Comments:

Injury/Illness Section [Complete only if Injury/Illness Incident type selected]

Who was injured?

- ☐ CH2M HILL Employee or CH2M HILL Temp Employee
- ☐ Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
- ☐ LLC Joint Venture Partner Employee
- ☐ LLC Joint Venture Project Subcontractor/Contractor
- ☐ Other

Name of Injured: _____ Job Title: _____

Employer Name: _____ Supervisor of Employee: _____

Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee: _____

Has the employee called the Injury Management Administrator (1-866-893-2514)?

☐ Yes ☐ No ☐ Not Sure

Has the injured employee's supervisor been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Complete for Non-CH2M HILL Employee Injuries

Has the project safety coordinator been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Project Safety Coordinator: _____

Body Part Affected: _____

Injury/Illness (Result): _____

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription): _____

Describe any work restriction prescribed (include dates and number of days): _____

Physician/Health Care Provider Information

Name: _____ Phone: _____

Was treatment provided away from the worksite?

☐ No
☐ Yes

Facility Name: _____

Address: _____

City: _____ Phone Number: _____

Was injured treated in an emergency room?

☐ No ☐ Yes

Was injured hospitalized overnight as an in-patient?

☐ No ☐ Yes

General Information Environmental Section [Complete only if Environment/Permit or Spill/Release Incident type selected]

Who had control of the area during the incident?

- ☐ CH2M HILL, Company: _____
☐ Subcontractor, Company: _____
☐ Joint Venture Partner/Contractor/Subcontractor, Company: _____
☐ Other, Company: _____
Relationship to CH2M HILL: _____

Property Damage Section [Complete only if Property Damage Incident type selected]

Property Damaged: _____

Property Owner: _____

Damage Description: _____

Estimated US Dollar Amount: _____

Spill or Release Section [Complete only if Spill/Release Incident type selected]

Substance: _____

Estimated Quantity: _____

Did the spill/release move off the property?: _____

Spill/Release From: _____

Spill/Release To: _____

Environment/Permit Section [Complete only if Environment/Permit Incident type selected]

Describe Environmental or Permit Issue: _____

Permit Type: _____

Permitted Level or Criteria (e.g., discharge limit): _____

Permit Name and Number (e.g., NPDES No. ST1234): _____

Substance and Estimated Quantity: _____

Duration of Permit Exceedence: _____



Lessons Learned

[Date] ESBG LL-11-xx

Subject	[Insert Descriptive Name of Lessons Learned]
CH2M HILL Project?	[Yes or No]
Situation	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
Lessons Learned (Recommendations and Comments)	<ul style="list-style-type: none">Bullet out any lessons learned, recommendations or other important "take away" information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.
Submitted By	[Name/Office Location/Phone]
Additional Information Contact	[Name/Office Location/Phone]
Keywords/Categories	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution.

Management Health, Safety, Security and Environment Inspection

Program/Project Name: _____
 Management Inspector: _____
 Date: _____

Work Being Performed: _____
 Project Number: _____
 Sector: _____

1. Job Information/Postings	A	C	I	N/A	Comments/Corrective Action(s)
a. Required postings in place (OSHA/State/Country)					
b. Emergency Contacts and Phone list posted					
c. Directions and map to hospital posted					
d. Incident Reporting Flow Chart posted					
2. HSSE Documentation					
a. HASP current (within 1 year), onsite, and signed					
b. AHAs available for all work and reviewed/signed					
c. Daily Pre-Task Safety Plan/Meeting completed					
d. SBO's completed weekly and emailed					
e. Self-Assessment checklists completed per HASP					
f. Environmental Plan available					
g. Emergency drill completed and documented					
h. E Permit compliance assurance measures documented					
i. HSE training up to date and documented					
3. Housekeeping/First Aid					
a. Work areas clean and organized					
b. Fire extinguisher, eye wash, 1 st aid/BBP kit in place					
c. Materials and waste labeled and in closed containers					
4. PPE and Air Monitoring					
a. PPE being worn as specified in HASP/AHA					
b. Air monitoring done per HASP and documented					
5. Heavy Equipment and Construction Operations					
a. Documentation of Competent/Qualified Operators					
b. Back-up alarms audible & no cell phone use					
c. High-visibility vests on ground personnel					
d. Daily inspections completed and documented					
e. Windshields/mirrors OK and seat belts worn					
6. Excavation, Trenching, and Land Disturbing Activities					
a. Competent person identified					
b. Daily inspection completed prior to entry					
c. Proper setup (sloping, shoring, exits, spoils)					
d. 3 rd party Utility Locate service used					
d. Storm water PPP and inspections/sampling conducted					
d. Erosion/sediment controls and dust controls in place					
7. Hand Tools					
a. Hand tools inspected prior to use					
b. Guards in place on tools					
c. Right tool for the job at hand					
8. Electrical					
a. All electrical cords, prongs, receptacles OK					
b. GFCI used on all circuits					
c. No energized electrical work incl. voltage testing					
d. Written Lockout Tagout system in use					

(Column - A=Adequate, C=Needs Consideration, I=Needs Immediate Action, N/A= Not Applicable or Not Assessed)

9. Ladders and Scaffolds	A	C	I	N/A	Comments/Corrective Action(s)
a. Ladders extend 36" above the landing and secured					
b. Ladders selected and used properly					
c. Scaffold planked, unaltered, and in good condition					
d. Scaffold/ladder users trained in inspection and use					
10. Hot Work					
a. Gas cylinders stored upright and secured					
b. Minimum 20' distance between fuels and oxygen					
c. PPE in use per HASP/AHA					
d. Fire watch in place w/adequate fire extinguishers					
11. Cranes					
a. Outriggers extended, swing radius protected					
b. Operator CCO licensed, competent person for rigging					
c. Annual certified crane inspection					
d. Chains and slings inspected, have rating tag					
e. Suspended load tag lines - no one underneath					
12. Drill Rigs					
a. Overhead electrical clearance adequate					
b. Daily inspections completed and available					
c. Emergency shut off functioning					
d. 3 rd party Utility Locate service used					
13. Hazard Communication and Chemical Use					
a. MSDS's present for all chemicals					
b. Chemical Inventory current and in HSP or on file					
c. Hazard communication briefing for all chemicals					
d. All chemicals labeled/stored as required					
e. SPCC Plan implemented for >1320 gals fuels/oils on site					
14. Fall Protection					
a. Full body harness worn properly, workers tied off over 6'					
b. Guard rails 42" high					
15. Material Handling					
a. Proper body positioning					
b. Objects less than 40 lbs. for one person lift					
16. Site Control					
a. Work Zones delineated, necessary signage in place					
b. Decontamination method is adequate					
17. Waste and Hazardous Materials Management					
a. Waste Tracking Log					
b. Hazardous waste onsite for <90 days					
c. Containers labeled, inspections conducted/documented					
d. HW manifests signed, tracked, copies kept on site					
e. HW Transporters trained and licensed, placards used					
18. Security and Emergency Planning					
a. Emergency coordinator designated					
b. Severe weather plans/controls in place					
c. Security plan/measures adequate					
19. Demolition					
a. ACM and Hazardous Materials Survey					
b. Asbestos/Lead based paint work approved per policy					

(Column - A=Adequate, C=Needs Consideration, I=Needs Immediate Action, N/A= Not Applicable or Not Assessed)

CH2M HILL Health and Safety Plan

Attachment 6

- Fact Sheets
- Tick Fact Sheet
- Vehicle Accident Guidance
- Working Alone
- Benzene Fact Sheet
- Methylene Chloride Fact Sheet
- Vehicle Accident Guidance
- Vinyl Chloride Fact Sheet
- Cadmium Fact Sheet
- Hexavalent Chromium (CR VI) Fact Sheet
- Lead Fact Sheet

Tick-Borne Pathogens — A Fact Sheet

Most of us have heard of Lyme disease or Rocky Mountain Spotted Fever (RMSF), but there are actually six notifiable tick-borne pathogens that present a significant field hazard. In some areas, these account for more than half of our serious field incidents. The following procedures should be applied during any field activity—even in places that are predominantly paved with bordering vegetation.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs and symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture.

On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. For this region, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite—normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. For Lyme disease, the bite area will sometimes resemble a target pattern. A variety of long-term symptoms may result if the illness is left untreated, including debilitating effects and death.



Deer Tick



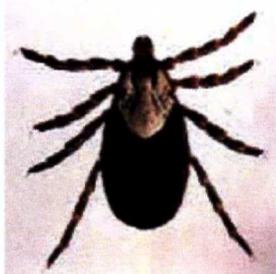
From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)



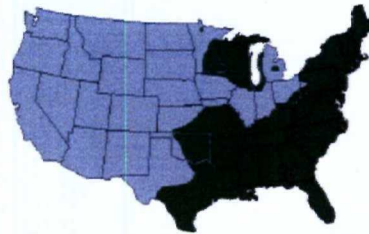
Lone Star Tick



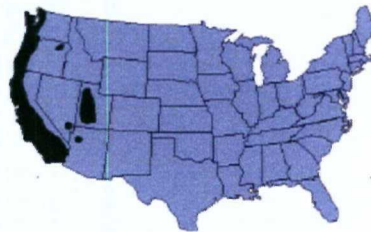
Dog Tick



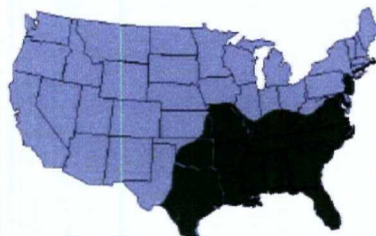
Rocky Mountain Wood Tick



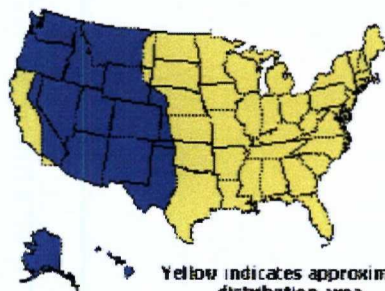
Distribution of Deer Tick (dark green)



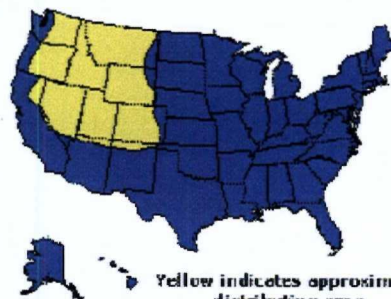
Distribution of Pacific Deer Tick (dark green)



Distribution of Lone Star Tick (Green)



Yellow indicates approximate distribution area



Yellow indicates approximate distribution area



Hazard Control

The methods for controlling exposure to ticks include, in order of most- to least-preferred:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acaricide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants—tick-borne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced by between 72 and 100 percent when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant or to a licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary to control exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be easily seen, wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used
- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots
- Wear long-sleeved shirts, a hat, and high boots
- Apply DEET repellent to exposed skin or clothing per product label
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label
- Frequently check for ticks and remove from clothing
- At the end of the day, search your entire body for ticks (particularly groin, armpits, neck, and head) and shower



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- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves any time ticks are handled

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid situations such as hand-to-face contact, eating, drinking, and smoking when applying or using repellents.

Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMERix™ Lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician.

Tick Check

A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

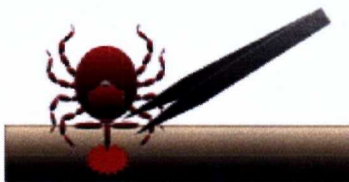
If a tick has embedded itself into the skin, remove the tick as described below.

Tick Removal

1. Use the tick removal kit obtained through the CH2M HILL Milwaukee warehouse, or a fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.

Error! Objects cannot be created from editing field codes.

2. Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.



3. Avoid squeezing, crushing or puncturing the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.

4. Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.

5. After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

6. Should you wish to save the tick for identification, place it in a plastic bag, with the date of the tick bite, and place in your freezer. It may be used at a later date to assist a physician with making an accurate diagnosis (if you become ill).



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Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Individuals previously infected with Lyme disease does not confer immunity—re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

The employee should contact the Injury Management/Return To Work provider (IMRTW), WorkCare using the toll-free number 866-893-2514 to report the tick bite. WorkCare will follow-up with each CH2M Hill employee who reports a tick bite and is at risk of developing Lyme disease by monitoring for symptoms up to 45 days, and will refer the employee to a medical provider for evaluation and treatment as necessary.



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2011 Vehicle Accident Guidance – ESG

Remember that if you are **renting** a non-CH2M HILL owned vehicle (short-term rental) in the U.S., you should carry the insurance card from the state where your driver's license is issued.

If you operate a **fleet vehicle**, carry the insurance card where the vehicle is registered.

For ALL Vehicles if you are in an accident:

1. If you are injured, call 911 for emergency medical treatment or 1-866-893-2514 to contact the CH2M HILL Occupational Nurse/Physician for minor injuries. If you feel you have not been injured, contact the RHSM for guidance on whether calling the CH2M HILL Occupation Nurse/Physician is applicable.
2. **Call the Police**--For any vehicle accident/damage, it is recommended that the local police (or site security/emergency services if working on a client site that provides such services) be called to determine if a report needs to be filed. In some instances, a report may not be required (during accident alerts, or in public parking lots). Document that the authorities were called and follow up with any guidance they give you. State requirements vary. If a report is filed, obtain a copy.
3. Notify Supervisor, (and PM/RHSM if working on a project site)
4. Complete a HITS report on the VO.

Additional Steps

To report an auto accident, and before a claim can be taken by telephonic reporting, have available your name (the company name alone is no longer accepted, a driver's name must be provided even for fender benders), location of accident and your office address if different than the accident location, business group and project number. A claim cannot be taken without your name, address, business group and your project number. By location the state where the accident occurred, and which office you are aligned to, i.e., accident occurs in Idaho, but you are out of the Denver office. Advise the claim recorder the accident occurred in ID, but that your office location is Denver. This will assist the claim intake person in identifying location coding for the claims.

Auto accidents involve two different sections of an Auto policy:

- 1) Liability to others due to Bodily Injury and Property Damage
- 2) Physical Damage - Comprehensive and Collision - damage to the vehicle CH employee is driving

CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Refer to the table below for additional notifications to make based on the type of accident experienced and type of vehicle being used.

**CH2MHILL****HSSE**
Target Zero
World-Class Performance**Liability - Bodily Injury or Property Damage to Others**

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill - Primary	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill - Primary	Contact Jennifer Rindahl/DEN (720-286-2449)
Client vehicle driven by CH2M Hill employee	Client's auto policy unless client has made CH2M Hill responsible for vehicle	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN (720-286-2449); contact client;
Short term lease (30 days or less)	Rental car company if rented through Enterprise, Budget or Hertz; CH2M Hill excess	Contact Broadspire (1-800-753-6737); Contact local branch of rental car company where vehicle leased (ERAC includes 24 hour roadside assistance) and Jennifer Rindahl/DEN (720-286-2449)
Short term lease (30 days or less)	CH2M Hill - Primary if rented through company other than our national agreements; \$100,000 deductible	Contact Broadspire (1-800-753-6737); Contact rental car company and Jennifer Rindahl/DEN (720-286-2449)
Personal vehicle used on business	Employee's personal auto policy; CH2M Hill on an excess basis	Contact personal auto insurance company; contact Jennifer Rindahl/DEN (720-286-2449)

Physical Damage - damage to vehicle CH employee was driving

Scenario	Which Coverage Responds	What to do if in an accident
CH2M Hill fleet, pool or project vehicle - long term lease - lower 48	CH2M Hill ONLY if vehicle is scheduled on policy - \$5,000 deductible	Contact Broadspire (1-800-753-6737); Jennifer Rindahl/DEN (720-286-2449); Linda George/DEN (720-286-2057)
CH2M Hill fleet, pool or project vehicle - long term lease - Alaska (North Slope)	CH2M Hill Equipment Schedule if scheduled on policy	Contact Jennifer Rindahl/DEN (720-286-2449)
CH2M Hill fleet, pool or project vehicle - long term lease	ARI if physical damage coverage purchased - \$500 deductible	Contact Jennifer Rindahl/DEN 720.286.2449; call ARI at 1-800-221-1645 give them Client Code and ARI fleet vehicle number; and notify Linda George/DEN - Fleet Coordinator - 720-286-2057
Client vehicle CH2M Hill Employee is driving	Client's auto policy unless client has made CH2M Hill contractually responsible for vehicle	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)
Short term lease (30 days or less) using corporate VISA	VISA if corporate credit card used and vehicle is not a pickup, truck, cargo van or used off-road	Contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Short term lease (30 days or less) through Enterprise (ERAC) and vehicle is used off-road and physical damage coverage included when vehicle leased	ERAC up to \$3,000 in damage; CH2M Hill's coverage is excess	Notify Rental Car Company; contact Jennifer Rindahl/DEN (720-286-2449) if damage over \$5,000
Short term lease (30 days or less) did not use corporate VISA	CH2M Hill - \$5,000 deductible (project responsibility)	Contact Broadspire (1-800-753-6737); Contact Jennifer Rindahl/DEN 720-286-2449; contact VISA - 1-800-847-2911 or http://www.visa.com/eclaim
Personal vehicle used on business	CH will reimburse the amount of the deductible carried on the employee's policy up to \$500 whichever is less	Contact Jennifer Rindahl/DEN (720-286-2449); contact client; contact Broadspire (1-800-753-6737)

Details for reporting a claim on the CH2M Hill VO are accessed by going to the VO home page and clicking:

GLOBAL ENTERPRISE SERVICES/INSURANCE & BONDING/CLAIMS REPORTING

HOW DO I REPORT A CLAIM TAB or access the following URL:

<https://www.int.ch2m.com/intrnl/voffice/corp/insurance/claims/report.asp?Menu=menu3h>



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How Do I Report a Claim? - Windows Internet Explorer provided by CH2M HILL

https://www.int.ch2m.com/.../office/corp/insurance/claims/report.asp?MenuIndex=38

File Edit View Favorites Tools Help

CH2M HILL Virtual Office CH2M HILL Virtual Office How Do I Report a Claim?

Insurance & Bonding

Home
Bond Request Forms
Best Practices - Risk Management in Difficult Economic Times
Certificate Request Forms
Claims Reporting
General Insurance Info
Global Subcontractor Insurance Guidelines
ORE
Project Insurance Request Forms
Resources
Legal Site

How Do I Report a Claim?

Domestic
Definitions of Physical Damage and Auto Liability

Physical Damage - Comprehensive and Collision - damage to the vehicle the CH employee is driving. CH2M Hill has Liability coverage for any auto - our policy will respond on either a primary or excess basis.

Auto Liability - Liability to others due to Bodily Injury and/or Property Damage.

Auto accidents prior to 5/1/11 - complete Automobile Loss Notice form and report to Zurich; form on the VO. (GLOBAL ENTERPRISE SERVICES/INSURANCE AND BONDING/CLAIMS REPORTING/HOW DO I REPORT A CLAIM/BUSINESS AUTO-ALL)

Phone: +1 (877) 246-3478 or +1 (800) 987-3373
Fax: +1 (877) 962-2567

Accidents that occur after 5/1/11, follow reporting instructions below.

Business Auto-Owned by Leasing Company, Rental Agency, for Physical Damage

Initial Report:	Employee involved in auto accident reports claim as soon as possible, per instructions in Special Reporting Section, to owner of vehicle (i.e., Enterprise, Hertz, Budget, ARI, etc.)
Copy:	Jennifer Rindahl/DEN Legal & Insurance Department
Backup:	Carol Dietz/DEN Legal & Insurance Department
Copy:	Broadspire involving any injury or damage to a third party; you will need to call in the claim using the 1-800 number below and advise this is an auto claim involving a rental agency vehicle
Insurer:	Greenwich Insurance Co (an XL company)
TPA:	Broadspire
Phone:	800-753-6737 (telephonic reporting for all auto claims, manned 24/7, 365 per year)

CONTENT CONTACT
Ann Donegan/DEN
+1 (720) 286-2492

For Personally Owned Vehicles (POVs):

CH2M HILL does not provide auto insurance for POVs, it is responsibility of the owner. If you are in a vehicle accident conducting company business, contact the police as above, supervisor, and 911 or CH2M HILL's occupational nurse/physician as stated above. Complete a HITS report. Contact Jennifer Rindahl/DEN for assistance for meeting personal insurance deductibles (up to \$500) with proof of insurance and deductible.

If using your POV for extended project use, notify the PM to make sure a rental car is not needed. Check your insurance policy for guidance on using the POV for business use.

Additional Resources:

[Claims Resource Manual](#)

**WORKING ALONE PROTOCOL
CALL - IN CONTACT FORM**

Date of site work: _____ Expected start time: _____

Name of CH2M HILL employee in the field: _____

Name of CH2M HILL employee responsible to receive contact: _____

Client Emergency Contact (if any): _____

CH2M HILL employee's contact numbers:

Radio # _____

Cell Phone # _____

Address and Location of work: _____

Directions/Map: _____

Planned Activity: _____

Specified Frequency and time for call in: _____

Time

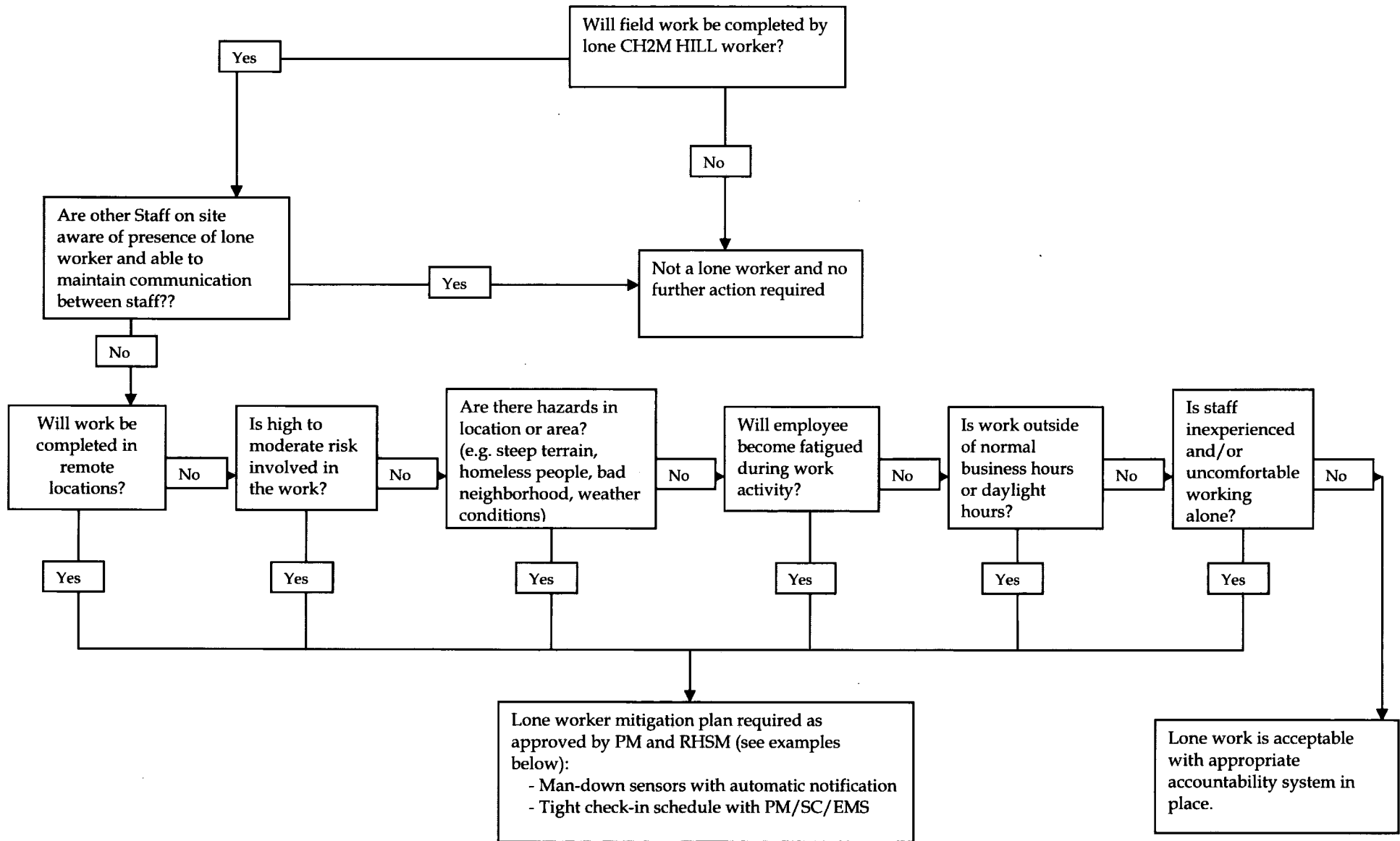
Verified

Location

If lone worker fails to call in at specified frequency/time:

- 1) Call worker's radio and cell to determine if an emergency exists.
- 2) If no reply, immediately call Client security/emergency service if there is one at the site.
- 3) If there is no client security call Emergency Services (911). Inform the dispatcher there is a lone worker that cannot be contacted and there may be an emergency on site. Provide the lone worker's name, their last known location, and your contact information.
- 4) After Emergency Services have been contacted, call the other emergency contacts, Project Manager, and Responsible Health and Safety Manager.

Lone Worker Protocol



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Benzene Fact Sheet

Uses and Occurrences: Found in gasoline and other fuels, and used in the manufacture of plastics, detergents, pesticides, and other chemicals.

Physical Characteristics:

Appearance:	Clear, colorless liquid
Odor:	Sweet, aromatic odor
Flammable:	Class IB; NFPA Rating: 3
Flash Point:	11°C (52°F)
Flammable Range:	1.3% to 7.5%
Specific gravity:	0.879; (water = 1.0)
Stability:	Stable
Incompatibilities:	Heat and Oxidizing Agents
Melting Point:	5.5°C (42°F)
Boiling Point:	80.1°C (176 °F)

Signs and Symptoms of Exposure:

Inhalation:	<u>Short term</u> : headaches, nausea, dizziness, respiratory irritation, convulsions, and respiratory paralysis. <u>Long term</u> : fatigue, nervousness, irritability, blurred vision, and bone marrow depression (leukemia)
Skin and Eye:	<u>Short term</u> : dermatitis, irritation. <u>Long term</u> : redness, blistering, and dry, scaly dermatitis
Ingestion:	Gastrointestinal irritation

Modes of Exposure:

Inhalation:	Vapors
Absorption:	Liquid
Ingestion:	Liquid

Exposure Limits:

Action level (AL):	0.5 ppm
PEL:	1 ppm
STEL:	5 ppm
PEL-C:	None
TLV:	0.5 ppm
TLV-STEL	2.5 ppm

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Benzene standard and Training
EL > PEL	Implement all portions of the OSHA Benzene Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety Glasses; contact lenses should **not** be worn

Skin: Chemical protective clothing and gloves

Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air; contact a physician

Skin: Quick drenching of body; wash with soap and water

Eyes: Flush with water for 15 minutes, lifting lower and upper lids occasionally; seek medical attention immediately

Ingestion: **DO NOT INDUCE VOMITING**; seek medical attention immediately

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Methylene Chloride Fact Sheet

Uses and Occurrences: Used in paint stripping, polyurethane foam manufacturing as a blowing agent, cleaning and degreasing, and chemical sample extraction. Solvent good for fats, oils, waxes, resins, and rubber. Used in propellant mixtures for aerosol cans. An extraction agent in the pharmaceutical industry.

Physical Characteristics:

Appearance:	Colorless liquid
Odor:	Chloroform-like odor; poor warning property
Flammable:	Combustible Liquid
Flash Point:	N/A
Flammable Range:	13% to 23%
Specific Gravity:	1.33; (water = 1.0)
Stability:	Stable under ordinary conditions of use and storage
Vapor Pressure:	350 mm Hg at 20 °C (68°F)
Incompatibilities:	Strong oxidizers; caustics; chemically active metals such as aluminum, magnesium powders, potassium and sodium; concentrated nitric acid
Melting Point:	-97 °C (-143°F)
Boiling Point:	39.8 °C (104°F)

Signs and Symptoms of Exposure:

Inhalation:	<p><u>Short Term:</u> Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting, and headache. Causes formation of carbon monoxide in blood, which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.</p> <p><u>Long Term:</u> Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances.</p>
Skin Contact:	<p><u>Short Term:</u> Causes irritation, redness, and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.</p> <p><u>Long Term:</u> Dermatitis</p>
Eye Contact:	Vapors can cause eye irritation. Contact can produce pain, inflammation, and temporal eye damage.

Ingestion: May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light-headedness to unconsciousness.

Modes of Exposure:

Inhalation: Vapor
Absorption: Solution
Ingestion: Ingestion of solution
Skin and Eye Contact: Solution

Exposure Limits:

Action Level: 12.5 ppm
PEL: 25 ppm
STEL: 125 ppm
PEL-C: None
TLV: 50 ppm

Exposure Level versus Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable. Maintain records of initial determination, and provide training.
EL > AL, EL < PEL/STEL	Ongoing monitoring, as required. Medical surveillance.
EL > PEL/STEL	All remaining requirements apply.

PPE:

Eye: Splash goggles; face shield.
Skin: Inner glove of polyethylene/ethylene vinyl alcohol, outer glove nitrile or neoprene, Tyvek or other full-body clothing.
Respiratory: Supplied air respirators are required.

First Aid:

- Inhalation: Move to fresh air; seek medical attention immediately. If breathing has stopped, perform artificial respiration.
- Skin: Promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing, promptly remove the clothing and wash the skin with soap and water. Get medical attention immediately.
- Eyes: Immediately irrigate the eyes with large amount of water, occasionally lifting the lower and upper lids. Get medical attention immediately.
- Ingestion: Seek medical attention immediately.

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Enterprise Standard Operating Procedure HSE-512

Vinyl Chloride Fact Sheet

Uses and Occurrences – Polyvinyl chloride and copolymers, organic synthesis, adhesives for plastics, and as a precursor in the production of the common plastic polyvinyl chloride (PVC). It is often a degradation product of a number of chlorinated compounds, including tetra-chloroethylene and trichloroethylene, at hazardous waste sites in soils and groundwater. It can also be a breakdown product of the combustion of PVC or other chlorinated compounds.

Physical Characteristics

Appearance:	Colorless gas
Odor:	Sweet; Odor threshold: 3,000 ppm
Flammable:	Class IA Flammable Liquid Gas; NFPA Rating: 4
Flash Point:	-78 °C (-108°F)
Flammable Limits:	3.6% - 33.0% (% by volume in air)
Specific gravity:	0.91; (water = 1.0)
Stability:	Stable under ordinary conditions of use and storage
Vapor Pressure:	2300 mm Hg (at 20 °C)
Incompatibilities:	Atmospheric oxygen and strong oxidizers may react to produce peroxide, which can initiate a violent polymerization reaction
Melting Point:	-155.7 °C (-248°F)
Boiling Point:	-14 °C (7°F)

Signs and Symptoms of Exposure

Inhalation:	<u>Short Term</u> : Dizziness, light-headedness, nausea, dullness of visual and auditory responses, drowsiness, and unconsciousness <u>Long Term</u> : Thickening of skin, contact and allergic dermatitis, fatigue, coughing and sneezing, abdominal pain, gastrointestinal bleeding, nausea, vomiting, indigestion, diarrhea, jaundice, weight loss, anorexia, and cold and tingling sensations of the hands and feet, carcinogen.
Skin contact:	<u>Short Term</u> : Skin contact with liquid can cause frostbite. <u>Long Term</u> : Dermatitis
Eye contact:	Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.

Modes of Exposure

Inhalation: Vapor
Absorption: Liquid causes frostbite
Ingestion: Ingestion of contaminated water

Exposure Limits

Action level 0.5 ppm
PEL 1 ppm
STEL None
PEL-C 5 ppm
TLV 1 ppm

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
EL > AL, EL < PEL	Implement portions of the OSHA Vinyl chloride standard and Training
EL > PEL	Implement all portions of the OSHA Vinyl Chloride Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety glasses, chemical goggles, face shield
Skin: Tychem SL or other full-body clothing, depending on the exposure. Nitrile, Viton or laminated film gloves.
Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air, begin rescue breathing if breathing has stopped and CPR if heart action has stopped, transfer promptly to a medical facility.
Skin: Immerse affected part in warm water. Seek medical attention.
Eyes: Flush with large amounts of water for at least 15 minutes. Seek medical attention immediately.
Ingestion: Contact a physician.

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Cadmium Standard of Practice HSE-504

Cadmium Fact Sheet

Uses and Occurrences

The manufacture and transportation of cadmium compounds; coatings on metals; nickel-cadmium storage batteries; nickel plating, power transmission wire; pigments in ceramic glazes, enamels, and fungicides; corrosion-resistant coatings on marine, aircraft, and motor vehicles; manufacture of nuclear reactor rods; and welding electrodes and solder.

Physical Characteristics

Appearance:	Soft, blue-white, malleable, lustrous metal or grayish-white powder; some compounds may appear as a brown, yellow, or red powdery substance
Odor:	Odorless
Flammable:	Severe fire hazard, such as dust
Flash Point:	Not Applicable
Flammable Range:	Not Applicable
Specific Gravity:	8.64 (metal dust)
Stability:	Very stable
Incompatibilities:	Nitric acid, boiling concentrated hydrochloric and sulfuric acids; contact of cadmium metal dust with strong oxidizers or with elemental sulfur, selenium, and tellurium may cause fires and explosion.
Melting Point:	321°C (610°F)
Boiling Point:	765°C (1,409°F)

Signs and Symptoms of Exposure

Short-Term (Acute):	<u>Dust and Fume:</u> Irritation of nose and throat; inhalation may cause a delayed onset of cough, chest pain, sweating, chills, shortness of breath, and weakness. Death may occur. <u>Dust:</u> Ingestion may cause nausea, vomiting, diarrhea, and abdominal cramps.
Long-Term (Chronic):	<u>Dust and Fume:</u> Repeated or prolonged exposure may cause loss of sense of smell, ulceration of the nose, shortness of breath (emphysema), kidney damage, and mild anemia. Exposure to cadmium has been reported to cause an increase incidence of lung cancer.

Modes of Exposure

Inhalation:	Dusts and fumes
Absorption:	None
Ingestion:	Dusts and solids

Exposure Limits

Action level (AL)	2.5 µg/m ³
PEL	5 µg/m ³
STEL	None
TLV	10 µg/m ³ , 2µg/m ³ (respirable)

Exposure Level versus Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Cadmium standard and Training
EL > PEL	Implement all portions of the OSHA Cadmium Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye:	Splash-proof or dust-resistant goggles; face shield
Skin:	Protective coveralls, gloves, and footwear
Respiratory:	Air-purifying respirators and supplied air respirators, depending on the exposure

First Aid

Inhalation:	Move to fresh air; seek medical attention immediately.
Skin:	Remove clothing and shoes; wash with large amounts of water.
Eyes:	Flush with water immediately, lifting the upper and lower eyelids; seek medical attention immediately.
Ingestion:	DO NOT INDUCE VOMITING; seek medical attention immediately.

Cr VI Fact Sheet

Uses and Occurrences

Chromium is a naturally occurring element in rocks, animals, plants, soil, and volcanic gases. Chromium occurs in the environment predominantly in one of two valence states:

- Trivalent (Cr III), which occurs naturally and is an essential nutrient, and
- Hexavalent chromium (Cr VI), which, along with the less common metallic chromium (Cr 0), is most commonly produced in plating processes

The major industrial sources of Cr VI compounds are chromate pigments in dyes, paints, inks, and plastics; chromates added as anti-corrosive agents to paints, primer, and other surface coatings; chrome plating by depositing chromium metal onto an item's surface using a solution of chromic acid; particles released during smelting of ferro-chromium ore; fumes from welding stainless steel or nonferrous chromium alloys; and as an impurity in Portland cement.

Physical Characteristics

Appearance:	Dark red flakes or powder
Odor:	None
Flammable:	Non-combustible solid, but will accelerate the burning of combustible materials
Flash Point:	None
Flammable Range:	None
Specific gravity:	2.7 for Cr VI
Stability:	Stable
Incompatibilities:	Reducing and oxidizing agents, acetic acid
Melting Point:	1907°C or 3465°F for Cr
Boiling Point:	2671°C or 4840°F for Cr

Signs and Symptoms of Exposure

- Short term (Acute): Coughing,, sneezing, chest pain, breathing difficulty, itching and burning sensation to skin and lungs.
- Long term (Chronic): Allergic (asthma like symptoms) respiratory reaction, skin and eye irritation, nosebleeds, contact dermatitis, allergic like skin reaction, ulceration and perforation of the nasal septum

Modes of Exposure

Inhalation: Dusts and fumes
Skin Absorption: Liquid
Ingestion: Dusts and liquid

Exposure Limits

Action level 2.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
PEL 5 $\mu\text{g}/\text{m}^3$
STEL None
TLV 5 $\mu\text{g}/\text{m}^3$

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Cr VI standard and Training
EL > PEL	Implement all portions of the OSHA Cr VI Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety glasses;
Skin: Chemical protective gloves and body protection
Respiratory: Air-purifying respirators and supplied-air respirators, depending on the exposure, and a PAPR if requested by the worker

First Aid

Inhalation: Move to fresh air; seek medical attention promptly
Skin: Quick drenching with water; wash skin with soap and water; seek medical attention promptly
Eyes: Flush with water for 15 minutes, lifting the lower and upper lids occasionally; seek medical attention promptly
Ingestion: Seek medical attention promptly

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Lead

Standard of Practice HSE-508

Lead Fact Sheet

Uses and Occurrences

Lead can be found in the following: construction materials for tank linings and piping; component of lead-acid storage batteries; lead solder; plastics; steel; and pigments for paints. Lead can also be found in waste rock associated with mining activities, wood debris or stock used for electrical co-generation activities, and soil and waste associated with manufacturing activities. Elevated levels of naturally occurring lead may also be found in the soil in certain parts of this country.

Physical Characteristics

Appearance:	Bluish-white, slivery, gray metal. Very soft and easily malleable
Odor:	None
Flammable:	Noncombustible
Flash Point:	Not Applicable
Flammable Range:	Not Applicable
Specific gravity:	11.35
Stability:	very stable
Incompatibilities:	hot nitric acid, boiling concentrated hydrochloric and sulfuric acids
Melting Point:	327°C

Signs and Symptoms of Exposure

Skin and Eye: Irritation

Ingestion and Inhalation (Acute Overexposure): Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise that develops quickly to seizures, coma, and death from cardio-respiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects that take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease that arise after periods of exposure as short as days or as long as several years.

Ingestion and Inhalation (Chronic Overexposure): Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the

mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic, there may be severe abdominal pain.

Modes of Exposure

Inhalation: Dusts and fumes
Skin Absorption: None
Ingestion: Dusts and solids

Exposure Limits

Action level 0.03 mg/m³
PEL 0.05 mg/m³
STEL None
PEL-C None
TLV 0.05 mg/m³

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL less than Action Level (AL)	Maintain exposure as low as reasonably achievable
EL greater than AL and less than PEL	Implement portions of the OSHA Lead Standard (i.e., initial medical monitoring) and Training
EL greater than PEL	Implement all portions of the OSHA Lead Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety Glasses
Skin: Coveralls or disposable coveralls to keep lead off clothing and to prevent the spread of lead contamination.
Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air, contact a physician
Skin: Wash with water
Eyes: Flush with water
Ingestion: Contact a physician

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 7

Observed Hazard Form

OBSERVED HAZARD FORMName/Company of Observer (*optional*):

Date reported: _____

Time reported: _____

Contractor/s performing unsafe act or creating unsafe condition:

1. _____

2. _____

3. _____

Unsafe Act or Condition:

Location of Unsafe Act or Condition:

Name of CH2M HILL Representative:

Corrective Actions Taken:

Date: _____

Project Safety Committee Evaluation:

Date: _____

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 8

Stop Work Order Form

CH2MHILL

Stop Work Order

REPORT PREPARED BY:

Name:	Title:	Signature:	Date:

ISSUE OF NONPERFORMANCE:

Description:	Date of Nonperformance:

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	Title:	Signature:	Date:

** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,*

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	Title:	Signature:	Date:

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Agency Inspection Target Zero Bulletin

TARGET ZERO BULLETIN

Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)

Do you know what YOU would do if an agency inspector arrived at your site unannounced?

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications* (see Attachment 12), describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

Notification of Inspections

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (RHSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Safety Coordinator (SC).
- The **ERC must immediately notify the RHSM/REM**, as appropriate, of unannounced inspections, or designate someone to call the RHSM/REM. The RHSM/REMs can provide guidance to the field staff and PM.

Inspector Credential Verification

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

Opening Conference

- The CH2M HILL Project Manager, ERC, RHSM, or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.
- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

Requests for OSHA Logs

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your RHSM for assistance in obtaining the OSHA 300 Log.

- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.
- Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

The Inspection

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the RHSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

Closing Conference

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, RHSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;
- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and LID.

Unannounced regulatory agency inspections may happen at any time on our projects -

Get your RHSM/REM and PM involved immediately if an Inspector arrives.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 10

Completed CH2M HILL AHAs

(To be added prior to field event)

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 11

**Material Safety Data Sheets
(To be added prior to field event)**

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 12 (on attached DVD)

CH2M HILL Health and Safety Standard Operating Procedures

SOP HSE-105, Drug-Free Workplace
SOP HSE-106, Emergency Planning
SOP HSE-107, Hazard Communication
SOP HSE-108, Hearing Conservation
SOP HSE-110, Training
SOP HSE-111, Incident Notification, Reporting and Investigation
SOP HSE-112, Manual Lifting
SOP HSE-117, Personal Protective Equipment
SOP HSE-121, Respiratory Protection

SOP HSE-201, Agency Inspections and Communications
SOP HSE-202, Bloodborne Pathogens
SOP HSE-204, Drilling
SOP HSE-206, Electrical Safety
SOP HSE-207, Exposure Monitoring for Airborne Chemical Hazards
SOP HSE-210, Hand and Power Tools
SOP HSE-215, Contracts and Subcontracts
SOP HSE-216, Traffic Control)
SOP HSE-218, Hazardous Waste Operations

SOP HSE-306, Earthmoving Equipment
SOP HSE-307, Excavation and Trenching Safety
SOP HSE-310, Lockout and Tagout

SOP HSE-403, Hazardous Material Handling
SOP HSE-417, Hazardous Materials Transportation

SOP HSE-503, Benzene
SOP HSE-504, Cadmium
SOP HSE-508, Lead
SOP HSE-512, Vinyl Chloride
SOP HSE-513, Hexavalent Chromium - Chromium VI

SOP HSE-610, Explosives Usage and Munitions Response (MR)



Drug-Free Workplace

Enterprise Standard Operating Procedure HSE-105

1.0 Introduction

It is CH2M HILL's intent to provide all its employees with a safe and healthy work environment in which to be productive. Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. Because CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior, it has established this Standard of Practice (SOP) which complies with and implements CH2M HILL's alcohol and substance abuse policies as outlined in CH2M HILL's **Employee Handbook**.

This SOP applies to CH2M HILL's United States employees and the firm's subcontractors who are contractually or legally obligated to have a drug-free workplace, which requires drug and/or alcohol testing or when good business practice would dictate as described below. Other than where contractually required, CH2M HILL Constructors, Inc. (CCI) and CH2M HILL's Construction Management Services (CMS) group, because of their involvement in actual field "hard hat" construction, and CH2M HILL's Munitions Response (MR) group because of the inherently hazardous nature of their munitions and explosive work are the only CH2M HILL operating unit where this standard of practice is currently approved for routine implementation. The requirements contained within this SOP apply to the following:

- All CCI, CMS and MR group employees regardless of job function
- Any CH2M HILL Member Company employees, including CH2M HILL Inc. (INC), Operations Management International (OMI), Industrial Design Corporation (IDC), Lockwood Greene (L-G) and CH2M HILL International LTD (CHIL) personnel who are assigned to conduct field work on CCI or MR projects
- All CH2M HILL Member Company subcontractors, including lower-tier subcontractors conducting field work on CCI or MR projects.
- This SOP applies to CH2M HILL BG's when performing CCI or MR projects or when performing projects for Client Programs that require the implementation of a DFWP, which requires drug and/or alcohol testing.
- The application of this SOP to other CH2M HILL operating units must be approved by the operating unit President and Corporate Director of Health, Safety and Environment in consultation with the Legal Department.

1.1 General Exceptions

- This SOP is not directly applicable to the CH2M HILL Canada Limited (CNR), since it only applies to CH2M HILL United States (US) employees and their subcontractors. However, CNR may develop their DFWP based on this SOP, to the extent it is determined to be legal by the applicable governing body (i.e. provinces).
- This SOP is applicable to the Nuclear Business Group, except where federal clients (i.e. DOE, NRC) require the application of specific DFWP requirements (i.e. 10CFR707).
- This SOP applies to the CH2M HILL Joint-Venture (JV) agreement or Limited Liability Company (LLC) when CH2M HILL is the majority partner (CCI, L-G, IDC and OMI). When CH2M HILL is the minority partner of the JV agreements or LLC, this SOP only applies to CH2M HILL covered employees, provided they remain on CH2M Hill's payroll and are only assigned to the JV or LLC.
- This SOP is not applicable to a Business Group (BG) project when a subcontractor employs union members and a DFWP is prohibited by contract between the unions and the subcontractor or BG entity. The degree to which the DFWP is applicable to employees represented by labor unions, will be subject to the BG's ability to negotiate the specific provisions with the affected unions.

Site visitors are exempted on CH2M HILL Member Company projects, where visitors visit a site for a day or less and are accompanied by someone who has been drug tested.

1.2 Business Group HSSE Lead Waivers

Business Group (BG) HSSE Leads for the BG's performing CCI or MR projects and are covered by this SOP, have the authority to waive the DFWP, as it applies to their subcontractors, based on the following guidelines:

- Subcontractor's performing low risk construction or maintenance activities (i.e. fencing, surveying or equipment service).
- Subcontractor's work scope must be completed within 2 weeks.
- Waivers do not apply to subcontractors performing higher risk construction activities, regardless of duration (i.e. trenching/excavation, crane operations, confined space entries or activities involving scaffolding, elevated work platforms or fall protection).
- BG HSSE Leads that waive the DFWP for their subcontractors must determine the appropriate level of H&S oversight of subcontractor's activities on the project.

2.0 Regulatory Review

This program conforms to the Drug-Free Workplace Act of 1988 and all-subsequent amendments to the act. This program also complies with state requirements.

Subcontractors who hold commercial drivers' licenses (CDLs) may be required to comply with additional requirements under the Department of Transportation (DOT).

3.0 Responsibilities

3.1 Employees and Applicants

All employees and applicants who fall under the scope of this SOP are responsible for following the requirements of this document. Each applicant must sign a form indicating that they have received an overview of this SOP and agree to the provisions of CH2M HILL's Drug-Free Workplace Program (DFWP). Employee responsibilities include never reporting to work while under the influence of illegal drugs or alcohol, and notifying their supervisor of prescription drug and nonprescription medication use if they believe that such use would impair their ability to perform the essential functions of their job or pose a direct threat to the health and safety of others (see Section 6.4 of this SOP). Employees must also notify their supervisor of any drug or alcohol-related convictions within 5 calendar days following the event using the Drug- and Alcohol-Related Convictions Form (Section 7.1, Form 2). In the event that employees want to contest their drug test results, they are responsible for notifying the Medical Review Officer (MRO) of any administrative or civil actions brought about as the result of contesting the test results.

3.2 Project and Construction Managers (PMs and CMs)

The PM or CM has the overall responsibility for implementing the Drug-Free Workplace Program on their project. While the PM or CM may explicitly delegate specific tasks to other staff as described in the sections that follow, they still retain the ultimate responsibility for completion of the following in accordance with this SOP.

- Create a project culture that does not tolerate drug or alcohol use, manufacture, distribution, possession, or sale
- Provide adequate resources to provide a drug-free project
- Confirm drug-free workplace requirements are included in subcontract documents, as appropriate
- Audit the subcontractor's drug-free workplace program
- Verify that subcontractors, including lower tier subcontractors, are doing a 5% random testing
- Ensure that all employees assigned to projects where drug screening is required have completed and passed a pre-employment or pre-assignment drug screen
- Discipline staff who violate CH2M HILL's alcohol and substance abuse policies, including this SOP
- Refer staff, as appropriate, to employee assistance and rehabilitation programs
- Ensure maintenance of project generated records in a confidential manner
- Provide employee drug education programs as required

3.3 Safety Coordinator (SC) or Unexploded Ordnance Safety Officer (UXOSO)

The SC or UXOSO which is usually the duty of the superintendent on construction sites is responsible for the following, as delegated by the PM or CM:

- Implementing CH2M HILL's alcohol and substance abuse policies, this Drug-Free Workplace SOP (HSE-105), and project-specific HS&E programs
- Consulting with the Drug-Free Workplace Program Administrator (DFWPA) when they suspect that drug or alcohol testing is required
- Conducting searches as required
- Assisting with implementation of the project's testing program, including escorting employees to the testing location (as needed)
- Referring employees to, and verifying compliance with, the Employee Assistance Program

Attachment 1 of this SOP provides field implementation guidelines for the SC

3.4 Drug-Free Workplace Program Administrator (DFWPA)

The CCI DFWPA is responsible for administering this SOP for all CCI, CMS and MR employees, as well as INC employees who work on CCI or MR projects. The DFWPA is also charged with performing the following specific tasks:

- Determining the project-specific requirements to ensure compliance with state and local regulations, client requirements, and labor agreements
- Determining the need for post-incident testing per this SOP
- Approving for cause testing and searches in consultation with the Human Resources Manager and Legal Department
- Approving MRO invoices associated with drug and alcohol testing
- Routing records to the appropriate parties as specified in this SOP
- Selecting the MRO

3.5 Human Resources Manager (HRM)

The HRM is responsible for including notification of drug and alcohol-testing requirements in job announcements and offer letters (Attachment 2) when required. They are also responsible for assisting the DFWPA, PM, or CM in addressing disciplinary and employee assistance issues related to a CH2M HILL employee's positive drug or alcohol test results. The HRM is also responsible for maintaining CH2M HILL employee records associated with drug- or alcohol-related disciplinary and employee assistance issues, and for including CH2M HILL's drug and alcohol testing requirements in job advertisements.

3.6 Contracts Administrator (KA)

The KA is responsible for including the Subcontractor Minimum Criteria Document (Attachment 3) and the Certification of Compliant Drug Policy (Attachment 9) in the Request for Proposal (RFP). The KA is responsible for ensuring that the appropriate contract language (see Attachment 5 for recommended language) is in all applicable subcontracts in order to ensure compliance with this SOP. The KA is also responsible for forwarding the subcontractor's written drug program to the responsible HSM for review and acceptance.

3.7 Subcontractors

Subcontractors who work on CH2M HILL field projects which fall under the scope of this SOP are required to comply with a drug-free workplace program that meets the minimum requirements listed in Attachment 3 unless determined to be unnecessary by the DFWPA or the business group HSSE Leads, based on the subcontractor's risk. See Section 6.3 of this SOP for additional information.

3.8 Medical Review Officer (MRO)

The Medical Review Officer (MRO) who is referred to by that name throughout this SOP, is listed in the table in Attachment 6 of this SOP and is responsible for the following:

- Identifying a network of collection facilities and laboratories that are licensed and authorized by the Department of Health and Human Services (DHHS) and all applicable state agencies to perform drug-free workplace testing
- Determining whether test results are positive or negative
- Notifying employees and DFWPA of test results
- Assisting the DFWA in determining drug-free workplace requirements
- Resolving issues surrounding contested results

If the MRO listed in Attachment 6 of this SOP does not meet specific state licensing requirements, the DFWPA, CCIDHS and CDHR will approve an alternative provider and laboratories and they will be listed in the site-specific written safety plan.

3.9 BG HSSE Leads

The BG HSSE Leads covered by this SOP are responsible for implementing this SOP for all CCI and MR project performed by their BG.

3.10 Client Program H&S Managers

Client Program H&S Managers are responsible for implementing SOP for all projects in their Program, while developing and implementing any additional processes and procedures to meet their client's DFWP requirements.

4.0 CH2M HILL Policy

CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances or alcohol that impairs an employee's work performance or behavior. A policy has been

established that CH2M HILL's employees and subcontractors shall not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited except where alcohol on premises is allowed on limited occasions with approval by office managers. Any violation of these prohibitions may result in discipline up to and including immediate discharge.

Additional information on CH2M HILL's drug and alcohol policy can be found in the CH2M HILL Employee Handbook.

5.0 Definitions

5.1 Assigned to Conduct Work

"Assigned to conduct work" is determined by the DFWPA and PM or CM on a project-by-project basis, depending on the degree of potential risk associated with being under the influence of drugs or alcohol while carrying out the services to be performed.

5.2 CH2M HILL

For purposes of this SOP, CH2M HILL refers to employees who work for I&E, which includes INC and CCI, except in reference to recordkeeping requirements. In the case of recordkeeping, CH2M HILL refers to the CH2M HILL family of companies.

5.3 Drug-Free Workplace Program Administrator (DFWPA)

DFWPAs administer this DFWP SOP for their CH2M HILL Member Company (INC and CCI).

5.4 Employee

For purposes of this document, the term employee includes full-time, part-time, and flex employees.

5.5 Field Work

Field work is considered to be any work-related activity conducted outside of the office environment. This can be as minor as a "couple-of-day" engineering evaluation or walk-through at the client's facility, or an occasional check on someone else's field work. However, a "windshield" tour, or escorted tour for a proposal, or similar purpose would not be considered field work.

5.6 Illegal Drugs

Illegal drugs are defined for purposes of this program as any drug that is not legally obtainable, which may be legally obtainable but has not been legally obtained, or which is being used in a manner, for a purpose, or by a person other than as prescribed.

5.7 Munitions Response Projects

Munitions Response (MR) projects includes projects that use explosives for construction or demolition work; projects where munitions and explosives of concern (MEC) hazards are

posed, which includes unexploded ordnance (UXO), discarded military munitions (DMM), and material that presents a potential explosive hazard (MPPEH); chemical warfare material (CWM), or munitions constituents (MC) contaminated soil and groundwater; ordnance demilitarization operations; Controlled Detonation Chamber (CDC) operations; and operations to avoid, or locate, identify, remove and dispose of munitions.

5.8 Positive Test Result

A positive test result is defined in Attachment 7 of this SOP.

5.9 Possession

Employees will be considered in possession of drugs or alcohol if these items are found on their person, in their personal possessions, or in lockers, vehicles, or other equipment or facilities assigned to them.

5.10 Reasonable Suspicion of Drug or Alcohol Use and For Cause

Reasonable suspicion of drug or alcohol use and “for cause” are defined as symptoms of drug or alcohol use observed by a reliable individual, including, but not limited to, observation of actual drug use, the smell of drugs or alcohol emanating from the employee’s person, or physical symptoms of drug or alcohol consumption including, but not limited to, slurred speech, alcohol on breath, loss of balance, disorientation, bloodshot eyes, or dilated pupils.

5.11 Safety Sensitive Positions

Safety sensitive positions are employees performing duties that have the ability to create hazards or damage to other individuals, the community, or the environment, or a position in which a momentary lapse in attention could result in injury or death to another person. This could also include employees who work in high hazard environments such as those requiring a competent person (scaffold, trenching, work at elevations, confined space, etc) who don't necessarily pose a hazard to others but could pose a risk to themselves if impaired.

Safety sensitive positions include, but are not limited to, safety coordinators; staff with emergency response responsibilities including those identified as CPR/first aid responders; staff responsible for air monitoring (including calibration); and staff responsible for shipping dangerous goods.

5.12 Site Visitor

Site visitors are employees who visit a site for a day or less and who are accompanied by a site manager/supervisor. Site visitors are employees who observe the project and are not exposed to significant HS&E hazards. The DFWPA must be involved in determining whether an employee is considered a site visitor. Site visitors are not required to be drug tested but must be escorted by someone who has been tested.

5.13 Subcontractor

For purposes of this document, a subcontractor is defined as a firm contracted to CH2M HILL or to CH2M HILL’s subcontractor (in other words, lower-tier subcontractors)

who conducts “field-work” onsite. When CH2M HILL is the sponsor or prime in a joint venture, all member companies are subject to this SOP as a subcontractor.

5.14 Workplace and Company Property

Workplace and company property are defined, for purposes of this SOP, as CH2M HILL owned or leased property; a project, client, or vendor site; or a company vehicle or vehicle rented for company business.

6.0 Drug-Free Workplace Program

The following sections contain the requirements of CH2M HILL’s Drug-Free Workplace Program. Frequently asked questions regarding this program can be found in Attachment 6 of this SOP, and field implementation guidelines can be found in Attachment 1 of this SOP.

6.1 Project-Specific Programs

Whenever drug testing is being conducted, this program will be followed unless prior approval is obtained from the DFWPA. In such cases, the program requirements must be documented in the project files.

As required by contract, the PM/CM must verify that employees assigned to projects where drug testing is required have passed the preemployment or preassignment test as required.

The Project Set-Up Checklist (See Attachment 11) can be used to verify that minimum steps have been followed when establishing a drug-free workplace program on a specific project.

When required by contract, subcontractors (including lower tier subcontractors) will develop and submit a drug-free workplace program that is as least as stringent as the requirements in this SOP. See Section 6.3 of this SOP for more information on subcontractor requirements.

6.2 Prohibited Conduct

The following conduct is prohibited and will be subject to appropriate disciplinary action, including discharge.

- Using, possessing, distributing, manufacturing, selling, attempting to sell, or being under the influence of illegal drugs or alcohol while on duty, while on company property, or on any work site. This applies regardless of whether an employee is on paid time. A limited exception to this rule applies at authorized functions (for example, holiday parties, client dinner meetings, etc.), where alcohol may be served. Employees are allowed to consume alcohol on such occasions in moderation. Employees are prohibited from driving after consumption if their alcohol consumption exceeds safe driving standards under state Department of Motor Vehicle (DMV) regulations.
- Failing to fully cooperate with any aspect of this SOP, including, but not limited to, refusing to promptly submit to required testing; giving false, diluted, or altered urine samples; refusing to submit to searches of personal possessions and company property assigned to employees for their use (such as lockers, vehicles, and other equipment or

facilities as required by this policy); and failing to comply with rehabilitation conditions imposed by CH2M HILL or rehabilitation counselors.

- Failing to promptly report conviction for an alcohol- or drug-related criminal offense if the conviction relates to work, unless otherwise restricted by state law. All drug and alcohol-related convictions that occurred within the last 5 years must be reported to the Human Resources Manager or Administrator when initially enrolled in the drug-testing program or within 5 calendar days of the conviction.

6.3 Subcontractor Management

As described in Section 3.8 of this SOP, CH2M HILL field subcontractors and their lower-tier field subcontractors are required to implement and comply with a drug-free workplace program that meets the requirements listed in Attachment 3 when a drug-free workplace program is required by contract or when working on CCI or MR projects. When subcontractors are required to comply with this program, its requirements will be included in requests for proposal. The subcontractor is required to include their drug-free workplace program and certification that they have a program which meets CH2M HILL's minimum requirements (See Attachment 3) with their other safety plan submittals as required in SOP [HSE-215](#). If subcontractors do not have a drug-free workplace program or their program does not meet CH2M HILL's requirements, the subcontractor may enroll in a Consortium Drug Program provided by CH2M HILL's Drug Program Service Provider to comply (See Attachment 4: CH2M HILL Drug Consortium Fact Sheet). The Subcontractor retains total responsibility for full and effective implementation of their drug-free workplace program as it applies to their employees and the employees of their lower tier subcontractors. CH2M HILL reserves the right to audit the subcontractor's safety plans, including their drug-free workplace program to verify implementation compliance.

Failure to implement and comply with a drug-free workplace program that is at least as stringent as CH2M HILL's program is grounds for dismissal. Additional information on CH2M HILL subcontractor oversight procedures can be found in SOP [HSE-215](#).

As described in Section 6.5.8 of this SOP, the subcontractor will notify the PM, CM, or SC, who in turn will notify the DFWPA of positive test results (except on preemployment tests) within 24 hours. Any subcontractor employee who tests positive for drugs or alcohol as stipulated by this SOP will be immediately removed from the project site. After six months, they may be reconsidered for assignment to the project if they have tested negative within 2 weeks of being reassigned to the project. The DFWPA is responsible for notifying the contracts administrator, if one has been assigned to the project, so appropriate records on the subcontractor's performance can be maintained.

As described in Section 6.10 of this SOP, the subcontractor is responsible for maintaining their own records. CH2M HILL may request copies of specific records or audit the subcontractor's recordkeeping practices.

6.4 Prescription and Nonprescription Medications

Employees and applicants using prescribed drugs or nonprescription medications that have a side effect that could affect the employee's ability to perform the essential functions of their job or to safely perform such job duties without posing a direct threat to their health and safety or that of others are required to notify the DFWPA or their supervisor

immediately of its side effects prior to reporting for work. The employee may be transferred to a position that is not considered safety sensitive.

Although the use of prescribed drugs or nonprescription medications that contain controlled substances as part of a prescribed medical treatment program is not grounds for disciplinary action, failure to report the use of such substances when required under this policy, illegally obtaining the substance, or use which is inconsistent with a prescription or label may subject an employee to disciplinary action.

6.5 Drug and Alcohol Testing

6.5.1 General Requirements

Testing will be conducted for the substances listed in Attachment 7 of this SOP by Substance Abuse and Mental Health Services Administration (SAMHSA)-certified facilities and monitored by the Department of Health and Human Services (DHHS). Pre-employment, pre-assignment and random testing will only entail drug testing, while post incident and for cause or reasonable suspicion testing must include both drug and alcohol testing. Employees who refuse to submit to drug or alcohol testing will be treated as if they tested positive and they may be disciplined, up to and including dismissal.

The DFWPA will notify the MRO when a testing facility is needed, and the MRO will select a facility to be used for drug or alcohol testing. The MRO is required to verify that testing facilities and laboratories use equipment and procedures that have a high degree of accuracy and integrity in collection and meet the requirements of the drug-free workplace program stipulated by the DHHS and other applicable state agencies. The laboratory, which analyzes the specimens, must be SAMHSA-certified, licensed and authorized by the DHHS and all applicable state agencies. CH2M HILL reserves the right to audit the MRO, laboratories, and specific testing facilities.

Prior to initial drug or alcohol testing, employees must complete the Policy Acknowledgement and Consent Form (Form 3). Typically this form is completed as part of the preemployment or preassignment testing, but it must be verified prior to any type of testing. Copies of these forms are maintained in the employee's HR file or the DFWPA's file and can be verified by contacting the HRM or DFWPA for CH2M HILL employees.

With the exception of preemployment or preassignment testing, employees who are required to submit to a drug or alcohol test will do so immediately. If they do not submit to a test the same day as notification is received, they will be treated as if they tested positive and may be disciplined, up to and including dismissal.

CH2M HILL will pay for all testing which the company requires for their employees. The employee will be responsible for paying for any tests they choose to have which CH2M HILL does not require. Subcontractors required to implement a drug-free workplace program are responsible for the costs associated with their programs.

6.5.2 Preemployment Testing

Persons given a conditional offer of employment will be required to sign the Policy Acknowledgement and Consent Form (Form 3) and be tested for drugs as part of the employment selection process when covered by the scope of this SOP. When preemployment testing is required, the Policy Acknowledgement and Consent Form will be

completed by the candidate and returned to the HRM. Applicants will not be hired, put on the payroll, or allowed to work for CH2M HILL unless they have passed the appropriate drug test.

For company or project transfers or pre-assignment testing, the employee may not be required to submit to another test if he/she has had a negative 5-panel drug screen within the past 30 days. In this instance, CH2M HILL reserves the right to adopt those test results.

A positive test result for a potential new hire will result in eliminating the person from consideration for current employment except under specific situations approved by the DFWPA, PM or CM, legal departments and HRM. A candidate will also be eliminated from consideration for current employment for tampering with, altering, or attempting to create a false negative result. Applicants who do not successfully pass the drug or alcohol test may be reconsidered for employment after 6 months.

The only exception to preemployment testing, which requires prior approval of the DFWPA, is when emergency hires are required. In emergency cases, an individual may be hired pending the drug screen as described in their offer letter (example Attachment 2). If the screen results are negative, the individual will continue working, but if they are positive, the individual will be immediately discharged.

6.5.3 Preassignment Testing

Existing employees may be required to be tested for drugs as part of a job assignment or when returning to work after an extended period of time. This includes employees transferring from a CH2M HILL company that does not require drug testing to a company that does (e.g., INC to CCI). When preassignment testing is required, the test must be completed within 30 days prior to coming onto the jobsite; the Policy Acknowledgement and Consent Form will be completed by the employee and returned to the DFWPA. When required, employees cannot be assigned to the project unless they have passed the appropriate drug test.

A positive test result for an existing employee will result in the employee not being assigned to the project that required drug testing except under specific situations approved by the DFWPA, PM or CM, legal departments and HRM. The employee who tests positive will be required to participate in an Employee Assistance Program (EAP), as described in Section 6.8 of this SOP, and may face disciplinary actions as described in Section 6.7 of this SOP. Employees who "choose" to be tested by requesting to work on a project or for an organization that requires testing will be treated the same as employees who are required to be tested because they are assigned to a project or organization that requires testing.

A person will be eliminated from consideration for the assignment for tampering with, altering, or attempting to create a false negative result, or a diluted or inconclusive result. Employees who do not successfully pass the drug test may be reconsidered for the assignment in 6 months.

For company or project transfers or preassignment testing, the employee may not be required to submit to another test if he/she has had a negative 5-panel drug screen within the past 30 days. In this instance, CH2M HILL reserves the right to adopt those test results. Pre-assignment tests must be completed within 30 days prior to being on the jobsite requiring testing (CCI or MR projects, or project sites where the client requires testing).

The only exception to preassignment testing, which requires prior approval of the DFWPA, is when emergency assignments are required. In emergency cases, an individual may be assigned to a position, which requires a drug screen, pending the drug screen result. If the screen results are negative, the individual will continue working on the assignment, but if they are positive, the individual will be immediately removed from the project.

6.5.4 Random Testing

CH2M HILL reserves the right to require all or a percentage of employees in a particular location or organizational unit to submit to random testing, except in states prohibiting random testing. A minimum of 5 percent of the workforce will be sampled at a frequency to be determined by CH2M HILL, and a random selection process will be implemented by the DFWPA to ensure employees in the group selected for testing have an equal chance of being selected.

When random testing is performed, no advance notice of testing will be given, and employees who are selected will be required to submit to testing, as soon as practical after being notified, but within the same day of random testing notification. If random testing of a specific employee will have undue impact on the project or the employee is traveling; the DFWPA can extend the time required for submitting to the test. If the employee does not submit to the test on the same day that notice is received and does not contact the DFWPA, they will be treated as if they tested positive and may be disciplined, up to and including dismissal.

6.5.5 Post-Incident Testing

Post incident drug and alcohol testing is required to be conducted following a work-related injury requiring off-site medical attention, any incident resulting in property damage over US \$5,000, or other incident classified as a serious near miss injury that occurs on a CCI or MR project. Post incident testing also applies to all CCI, CMS and MR employees covered by this SOP, regardless if they are working on a non-DFWP covered project (i.e. CH2-Inc project) or in the office. Post-incident testing may also be required under other circumstances as dictated by the DFWPA. Provisions for "Hospital Kits" must be provided to DFWP covered projects for serious injuries that require hospital, ambulance or paramedic care, so that the drug test specimen may be properly collected.

If post-incident testing is to be conducted because of observed behavioral problems, the For Cause and Reasonable Suspicion Documentation Form (see Form 4) must be completed as described in Section 6.5.6 of this SOP.

6.5.6 For Cause or Reasonable Suspicion Testing

When there is cause or reasonable suspicion that an employee has taken drugs or consumed alcohol while at work, or returned to duty with drugs or alcohol in their body, they will be required to immediately submit to drug or alcohol tests. The DFWPA (in consultation with the HRM and Legal Department) must approve for cause or reasonable suspicion testing for CH2M HILL employees and subcontractor personnel prior to requiring an employee to submit to the test. The For Cause and Reasonable Suspicion Documentation Form (Form 4) will be used to determine and document reasonable suspicion.

For cause or reasonable suspicion testing will include both drug and alcohol testing.

Employees who are required to submit to reasonable suspicion testing are prohibited from transporting themselves to the collection site. The PM or CM or the SC will arrange for transportation. When possible, the employee will be transported by a CH2M HILL staff member.

6.5.7 Rehabilitation Follow-Up Testing

If an employee enters a rehabilitation program (see Section 6.8 of this SOP), they may be subject to periodic testing upon their return to work. The specific requirements which are based on recommendations from the MRO will be determined on a case-by-case basis and documented in the Rehabilitation and Return-to-Work Agreement, but may involve return-to-work testing as well as period testing, for up to 2 years.

6.5.8 Notification of Results

The MRO will make the determination, using the criteria in Attachment 7 of this SOP and the information provided by the employee on prescription and nonprescription medications, whether a sample is positive. The MRO must notify the DFWPA of all test results and in the case of a positive test result within 24 hours of a confirmed positive result.

When CH2M HILL is notified of a "dilute" sample, the employee's supervisor will be contacted by the DFWPA so they can escort the employee to a collection site for resampling. The employee must be required to submit to the escorted test without prior warning. If these procedures are followed and the second test comes back "dilute", the results will be considered negative. A refusal to retest under these conditions will be considered a positive result and the employee will be disciplined accordingly.

When an employee's sample cannot be analyzed because the MRO suspects the sample has been tampered with, the employee will be escorted (as described above for "dilute" samples) and the test must be observed. Once someone has been required to have an observed sample, all subsequent tests related to that first observed sample will be observed (e.g., If the observed retest results in a positive test and the employee enters into a random rehabilitation testing program, subsequent tests would be observed throughout the rehabilitation testing. Alternatively, if the observed retest resulted in a negative result, subsequent testing would not be observed.)

If an employee tests positive, the MRO will contact the employee regarding the results of their test. Once the positive has been confirmed by the MRO, the DFWPA will be notified of the results.

Drug test results that are "positive" as a consequence of using marijuana for medical purposes and/or hemp products will be considered a "positive" test result. The consequences of having a positive drug test result are described above.

Except in the case of preemployment testing, if a subcontractor's employee has a confirmed positive test result, the subcontractor will be required to notify CH2M HILL of a test result within 24 hours and provide written documentation that the employee has been permanently removed from the project site. CH2M HILL will not receive specific test results for subcontract personnel.

All CH2M HILL personnel privy to an employee's drug screen result must do everything possible to maintain the confidentiality of that employee. Only company individuals with a

work-related need-to-know will be given the results of an employee. This confidentiality requirement extends to all results whether positive or negative. Deliberate disregard for an employee's right to the confidentiality of his/her drug screen result will be grounds for disciplinary action.

6.5.9 Contesting Results

Employees who wish to contest their test results are required to notify the MRO, the DFWPA, and the HRM in writing regarding the reasons why they are contesting the results as soon as possible, but no later than 5 working days after notification of the test results. A portion of the original sample will be retested by a SAMHSA-certified laboratory, at the employee's expense. The employee will be reimbursed if the original sample is found to be negative as a result of the retesting.

Employees who contest their results must notify the MRO and laboratory of any administrative or civil actions brought about as the result of contesting their test results.

6.6 Searches and Inspections

The subcontractor and CH2M HILL must be able to conduct searches of project locations (vehicles, lockers, desks, filing cabinets, or equipment owned or being operated by Subcontractor personnel) and employee's personal property brought onto project locations (briefcases, purses, backpacks, coats or vehicles). CH2M HILL will only conduct searches and inspections of their employees, while subcontractor will only conduct searches and inspections of their employees, based on reasonable suspicion and cause that an affected employee may be in violation of the CH2M HILL DFWP Policy. CH2M HILL must be notified prior to conducting a search. CH2M HILL must notify subcontractor (project manager or site supervisor) of reasonable suspicion or cause to conduct a search of a subcontractor's employee.

As required by contract, the client may also be contacted before searches or inspections are conducted. The employee must sign the Search Consent and Documentation Form (Form 5) prior to having a search or inspection conducted of the employee's personal property. The DFWPA or the subcontractor is responsible for maintaining this form which will also document findings of the search.

A refusal to submit to, or cooperate with a search, will result in immediate discipline, up to and including dismissal. The Search Consent and Documentation Form will also be used during the search and inspection to document findings.

6.7 Disciplinary Actions

Employees who test positive for drugs or alcohol will be immediately removed from the project requiring the drug test. The employee's supervisor, senior on-site manager and DFWPA, in consultation with HR and the Legal Department, will determine an appropriate action, including the level of discipline, which includes actions ranging from providing an opportunity for entry into a rehabilitation or counseling program (see Section 6.8 of this SOP) to suspension or dismissal. This decision is based on totality of circumstances.

Subcontractor's employees who test positive for drugs or alcohol will be immediately removed from the project. Subcontractors will determine the appropriate disciplinary action that applies to the affected employee.

6.8 Employee Assistance

CH2M HILL has an Employee Assistance Program (EAP) that can assist their employees who have drug and alcohol dependency problems. Employees may enter the EAP in one of two ways:

- Employees who have drug or alcohol dependency problems or believe they may have a problem are encouraged to contact the EAP directly for assistance. Although CH2M HILL supports voluntary treatment efforts, it is the employee's responsibility to pursue treatment before dependency problems result in a violation of CH2M HILL's alcohol and substance abuse policies. Employees who are selected for random testing may seek to participate in the EAP but they will still be required to participate in the random testing program and their involvement with the EAP will not influence how the results are treated.
- If it is determined that a referral to EAP is the appropriate action when an employee tests positive for drugs or alcohol (see Section 6.7), they are required to participate in EAP and follow the steps identified by EAP staff. When appropriate, and if action is a referral to an EAP, (section 6.7) employees testing positive for drugs or alcohol will be required to participate in an EAP.

In accordance with employment practices, the HRM and supervisor will determine whether an employee who, for the first time, voluntarily reports they have a drug or alcohol dependency problem and participates in an EAP's drug or alcohol dependency program, should be placed on a leave of absence to allow for rehabilitation treatment or be reassigned to another job duty. To protect their position with CH2M HILL, an employee seeking assistance or required to participate because of a positive result must agree to all treatment, rehabilitation, aftercare, and follow-up testing as set forth in a Rehabilitation and Return to Work Agreement memo developed by the employee, HRM, DFWPA, and the supervisor. As part of the Return to Work Agreement, the employee may be required to be tested upon return and periodically for two years following their return. The employee may be permitted job protection and rehabilitation only one time. Any further violation of the Alcohol and Substance Abuse policy, this SOP, or Rehabilitation and Return to Work Agreement will result in disciplinary action, up to and including discharge.

Employees, who are required to participate in EAP because of a positive drug or alcohol test result, must follow EAP recommendations for treatment and a random testing program. Failure to follow the EAP recommendations exactly and complete the entire program will be grounds for discharge.

CH2M HILL's financial participation in rehabilitation will be limited to existing leave and medical benefits provided under the employment policies applicable to the employee at the time. CH2M HILL is not responsible for employee assistance for non-CH2M HILL employees.

6.9 Work Reassignment

Employees who tested positive for drugs or alcohol and who are removed from the project, cannot be reassigned to projects requiring a negative drug/alcohol test, nor function in “safety sensitive” positions, until a negative drug/alcohol test is obtained from the affected employee and the employee is successfully participating in an EAP.

Work restrictions, determined by the DFWPA, in consultation with the employee’s Supervisor, Legal and HR, will be outlined in the employee's Return to Work Agreement. If the employee tests negative for six months as part of their rehabilitation testing program, the work restrictions will be removed.

6.10 Recordkeeping

All records associated with this program will be treated as confidential records and managed as such. These records, however, are not considered medical records. All official copies of records, except medical records, will be maintained in the employee’s corporate HR or subcontractor file or in the DFWPA’s file, including summaries of positive or negative test results. Medical records and detailed drug and alcohol testing results, which include the specific substances testing positive, will be maintained and managed by the MRO. Attachment 10 of this SOP provides additional information on who is responsible for recordkeeping.

Subcontractors are required to maintain records associated with their drug-free workplace program on their own employees and lower tier subcontractors. CH2M HILL reserves the right to request copies of specific records and to audit the subcontractor’s recordkeeping system.

6.11 Employee Training

CH2M HILL will provide their employees and their supervisors with a drug-free workplace and an alcohol education awareness program. This program will include the dangers of drug and alcohol abuse in the workplace; availability of drug and alcohol counseling, rehabilitation, and the CH2M HILL Employee Assistance Program; an overview of the CH2M HILL’s Drug and Alcohol Policy and this SOP; and the disciplinary actions that may be imposed on employees who violate this SOP.

CH2M HILL employees will be required to complete initial awareness training and periodic awareness training in the form of a computer-based program, seminar, brown-bag lunch, or receiving informal emails or flyers. The frequency of training will be annually or more frequently as required by client contract.

Subcontractors are responsible for educating their own employees about drugs and alcohol. CH2M HILL reserves the right to audit the subcontractor’s drug and alcohol education programs.


7.0 Attachments

- Attachment 1: [Field Implementation Guidelines](#)
- Attachment 2: [Offer Letters](#)
- Attachment 3: [Minimum Criteria for Drug-Free Workplace Program](#)
- Attachment 4: [Consortium Fact Sheet](#)
- Attachment 5: [Drug Clause Subcontractor Language](#)
- Attachment 6: [Frequently Asked Questions](#)
- Attachment 7: [Drug and Alcohol Testing Criteria](#)
- Attachment 8: [Notification of Drug-Free Workplace Program](#)
- Attachment 9: [Certification of Compliant Drug Policy](#)
- Attachment 10: [Recordkeeping Requirements](#)
- Attachment 11: [Project Set-Up Checklist](#)

7.1 Forms

- Form 1: [Form 1 intentionally left blank](#)
- Form 2: [Drug and Alcohol Conviction Form](#)
- Form 3: [Policy Acknowledgement and Consent Form](#)
- Form 4: [For Cause and Reasonable Suspicion Documentation Form](#)
- Form 5: [Search Consent and Documentation Form](#)

8.0 Revision Log

Revision	Date	Description	Prepared By	Approved By:
1.0	2/24/2006	Updated to Standard Operating Procedure	Angelo Liberatore and Elaine Senecal	



Drug-Free Workplace Standard of Practice HSE-105

Attachment 1: Field Implementation Guidelines

These field implementation guidelines are intended primarily to provide information to the safety coordinator (SC), or unexploded ordnance safety officer (UXOSO) on their role in implemented drug-free workplace programs on field projects, but contain information that is useful to others responsible for implementing a drug-free workplace program. Questions regarding these guidelines should be addressed to the DFWPA.

Frequently asked questions about CH2M HILL's Drug-Free Workplace Program are found in Attachment 6 of this SOP.

Establishing a Drug-Free Workplace on a Project

The drug-free workplace requirements will be specified in the contract documents. As the SC or UXOSO, you are responsible for knowing whether a drug-free workplace program is required on your site and if so, what the specific requirements are. Questions regarding the requirements should be addressed to the DFWPA.

The DFWPA will work with the MRO to set up a testing location near your project site or arrange to have specimen collection performed at the site. You need to verify that this has occurred.

Prior to the start of fieldwork, you need to verify with the DFWPA that all project personnel have been tested and post the notification in Attachment 8 of this SOP (or equivalent).

Complete the Project Set-Up Checklist to verify that the minimum steps have been taken.

Type of Testing

Preemployment or Preassignment Testing

Each employee is required to complete the Policy Acknowledgement and Consent Form. This form is not only important because it is the method for initiating preemployment or preassignment testing, but if there is a problem with an employee, you will need to have this form signed before you can take action. You are responsible for verifying that all employees have completed the form (or equivalent). For CH2M HILL employees, these records are part of the employee's HR record, and for subcontractor employees, they are part of the subcontractor's files. You may need to contact the HR Manager (HRM), the Drug Free Workplace Administrator (DFWPA) in the case of INC employees working on CCI or MR projects, or contract administrator (KA), respectively, to help you verify that the appropriate records are in place. If during the course of the project you receive a completed form from an employee, you need to send it to the DFWPA.

When drug or alcohol testing is required, employees cannot work onsite prior to successfully passing the test unless they have received permission as described in Section 6.5.3 of the SOP. The PM must notify the DFWPA well in advance of any CH2-Inc staff scheduled to work on a CCI or MR project that requires drug testing. The SC or

UXOSO is responsible for verifying with the DFWPA that CH2-Inc staff required to pre-assigned drug tested have successfully passed their drug and alcohol tests. The only exception to this requirement is explained in Section 6.5.2, Section 6.5.3, and Attachment 6 of this SOP.

Random Testing

As an SC or UXOSO, you have very few responsibilities associated with the random testing program other than knowing the random testing requirements for the site. The PM or CM may also ask you to help communicate the random testing requirements to the field team and answer questions that may arise (see FAQs, Attachment 6 of this SOP).

Either the DFWPA, the PM, CM, or superintendent will notify the individual that they have been chosen for the test and make sure the selected person goes straight to the collection facility. In certain circumstances, the DFWPA, PM or CM may ask you to escort the selected employee to the collection facility.

Post-Incident Testing

Post-incident testing will be conducted in accordance with the requirements of this SOP. The DFWPA, the PM, or the CM may ask you to communicate these requirements to the field team or drive the individual to the testing facility.

“For Cause” or “Reasonable Suspicion” Testing

If “for cause” or “reasonable suspicion” testing is needed, it must be approved by the DFWPA and HRM in consultation with the Legal Department before any action is taken. Although the following list is not all-inclusive, this list provides typical situations that may indicate the need for this type of testing.

- Abnormal behavior is observed, such as drowsiness or sleepiness, slurred or incoherent speech, unusually aggressive behavior, severe mood swings, lack of coordination, lack of balance, disorientation, or difficulty focusing.
- Unusual physical characteristics are displayed, such as red, watery, or glassy eyes; dilated or constricted pupils; face or cheeks flushed or sallow.
- Frequent unexplained absences from work are noted or reported.
- Evidence is found that an individual has tampered with a drug test.
- Evidence is found that an employee has used, possessed, sold, solicited, or transferred drugs while working; while on CH2M HILL or CH2M HILL’s client’s premises; or while operating CH2M HILL’s vehicles, machinery, or equipment.

When you suspect a need for testing, confirm your suspicions with a supervisor whenever possible. If, after consultation with a supervisor, you determine that this type of testing is warranted, you must complete the For Cause and Reasonable Suspicion Documentation Form and contact the DFWPA immediately for assistance and approval. The DFWPA (in consultation with the HRM and Legal Department) will determine if you, the PM, or the CM should notify the person under suspicion and assist in setting up the appropriate tests. Do not talk to the person about your suspicion until after talking to the DFWPA. If you are unable to reach the DFWPA, call the HRM for approval.

Process

Enrollment

- A collection site in your area will be identified by the DFWPA

Contact the DFWPA (or representative) for a supply of Chain of Custody (COC) forms and Hospital Collection Kits

- You will need to give the employee the blank COC and the telephone number and address of the collection site that has been assigned to your location. You need to instruct the donor to go directly to the collection site and to bring the blank COC and a photo ID. The form will be completed by the collector.
- For, post-accident and reasonable suspicion tests, you or someone designated by you must escort the employee to the collection site. Be sure to bring along the required COC.

Reporting

Typically, results are reported by the MRO within 48-72 hours. Positive results may take longer since they must be validated before they are reported. If the donor has not been contacted within 7 days, they may assume their result is negative. Results will be given to the donor upon request. Results will only be reported to non-CH2M HILL employees, including clients, after written authorization is obtained from the donor. The donor should contact the HRM or DFWPA.

Results and Other Inquiries

If a donor needs to speak with an MRO about a result, have him/her call

HRPLUS Donor Line.....1-888-644-7828, Option 4

Notification of Results

You are not directly responsible for notifying employees of their test results.

Contesting Results

If an employee tells you that they want to contest their positive drug test results, inform them that they need to submit in writing the reasons why they are contesting the results; this written statement must be submitted to the MRO and the DFWPA or HRM. You should remind the employee that they have 5 working days from receipt of their test result to contest it. If you believe someone will be contesting their test results, notify the DFWPA.

Unfit For Duty

You are not directly responsible for determining whether someone is unfit for duty, but the information you collect and document about suspicious behaviors may be the basis for this determination. When it is determined that someone is unfit for duty, their supervisor will discuss the issue with the employee and work with the PM, CM, DFWPA, or HRM, in consultation with the Legal Department, to determine if testing is required.

Searches

Searches are required when there is reasonable suspicion that the employee is in violation of the Drug-Free Workplace Program (see Section 6.5.6 of this SOP). Many times the same clues you use to determine whether “for cause” and “reasonable suspicion” testing is needed will be used to determine whether a search is warranted. Whenever possible, confirm your suspicions with a supervisor before conducting a search. If, after consultation with a supervisor, you determine that a search is warranted, you must, before taking any action, contact the DFWPA (who will consult with the HRM and Legal Department) immediately for assistance and approval. After receiving approval to proceed from the DFWPA (or HRM if you are unable to reach the DFWPA) which includes clearance from the Legal Department, you can complete the search as follows:

- Before conducting a search, have the employee sign a Search Consent and Documentation Form. If the employee refuses, tell them the search is a mandatory condition of employment and that employee noncooperation will result in immediate dismissal. If an employee refuses a search, contact the DFWPA immediately. See below for guidance on removing employees from the site.
- Document your search using the Search Consent and Documentation Form.
- Limit your search to looking in lockers, cars, etc., and asking the employee to empty pockets, identify suspicious bulges, etc.
- Do not pat down an employee.
- If you find drugs or alcohol, seize the materials and use the Search Consent and Documentation Form to document what has been seized. If you have seized materials, have the PM or CM, immediately interview the person.

The following provides a brief overview of the physical properties of common drugs you may find when completing a search. This list should not be considered all-inclusive; you should seize any substances you believe to be prohibited.

- Opium: Dark brown chunks or powder
- Heroin: White or brown powder
- Morphine: Brown or clear liquid
- Codeine: Pill or syrup (including certain types of cough syrups)
- Stimulants (such as, Cocaine, Amphetamines): Fine white powder, liquid, or tablets
- Hallucinogens (for example, LSD, Mescaline, Peyote): Liquid, powder, or tablets
- Cannabis (such as, marijuana, hashish): Dark powder, green tobacco-like material, or oil

Removing Employees from Site or Restraining Employees

For legal reasons, you cannot physically restrain an employee to prevent them from driving home after being suspected of drug or alcohol use. In front of a witness, take the following actions in the order listed:

- Offer the person a ride home.
- Offer to call someone to drive them home.
- Tell the person that CH2M HILL will notify the police if they attempt to drive.
- Notify the police, telling them the facts only about the employee's appearance and behavior. Do not draw conclusions or state opinions as to whether the employee is under the influence of drugs or drunk. Tell the police the employee's location, and if you have the information, a description of the car and license plate number.
- Under no circumstances should you attempt to restrain the employee.

Recordkeeping

All records that are generated as part of the Drug-Free Workplace Program must be submitted to the DFWPA and the HRM. You shall not maintain copies of records onsite.

See Section 6.10 for additional information on recordkeeping requirements.

January 20, 2006

Name

Address

City, state zip

Dear name:

On behalf of CH2M HILL Constructors, Inc. (CCI), I am pleased to offer you a position in our (ABC) office. As a JOB TITLE, you would be a full-time core employee assigned to CCI's XYZ Business Group under the management and day-to-day supervision of supervisor's name.

This offer is contingent upon successfully passing a drug test and an investigative consumer report (background check) and/or consumer credit report.

Please review the Compensation, Benefits, and Employment Status Information Attachment ("Attachment"); the Business Conduct Policy; the Business Conduct Agreement; the Employee Administration Agreement; the FCRA Summary of Rights and Disclosure Form; the Background Check Disclosure Form; the Background Check Authorization Form; the Frequently Asked Questions Concerning Alcohol and Substance Abuse Policy; the Drug-Free Workplace Acknowledgement and Consent form; and the Employment Eligibility Verification (Form I-9), which are enclosed in this offer package.

If you find this offer acceptable, please (1) sign on the last page of the Attachment and (2) return a signed original of the Attachment and a copy of this letter along with all of the other forms outlined above to HR REP. For your convenience, two copies of the letter are enclosed. If you have any questions or concerns, please feel welcome to contact HR REP at 720-555-1234.

Also, in order to expedite the hiring process once this offer is accepted, please fax signed copies of the following forms no later than DATE, 2006 to HR REP at 720-555-1234: Signed copy of offer, Background Check Authorization Form, Business Conduct Agreement, the Employee Administration Agreement, and the Drug Free Workplace Acknowledgement and Consent Form.

We would appreciate your decision by DATE. Should you accept, we would like you to start work on a date that is mutually agreeable to you and SUPERVISOR. We look forward to your acceptance and to working with you in the near future.

Sincerely,

CH2M HILL Constructors, Inc.

NAME

TITLE

Job Req. # 000000BR

Enclosures: Compensation, Benefits, and Employment Status Information Attachment

Summary of Employee Benefits

Employment Eligibility Verification (Form I-9)

Business Conduct Policy

Business Conduct Agreement

Employee Administration Agreement

Drug-Free Workplace Policy Acknowledgement and Consent form

Frequently Asked Questions Concerning Alcohol and Substance Abuse

Policy

FCRA Summary of Rights and Disclosure Form

Background Check Disclosure Form

Background Check Authorization Form

Annual Report

cc: Ron Campbell/DEN

MANAGER/AAA

SUPERVISOR/AAA

Nancy Orr/DEN

HR Records/DEN



ATTACHMENT

COMPENSATION, BENEFITS, AND EMPLOYMENT STATUS INFORMATION FOR FULL-TIME CORE EMPLOYEES

Extended To: NAME

Offer Dated:

The following paragraphs will provide you with more detailed information on the various aspects of our offer.

COMPENSATION

- Your rate of pay would be \$00000.00 per hour.

You would receive overtime pay in accordance with federal/state law and CH2M HILL policy. You would be paid biweekly, every other Friday.

For internal classification purposes, your position would be designated as an **TITLE & JOB CODE**.

OWNERSHIP PROGRAM

CH2M HILL has a comprehensive Ownership Program. Coupled with the firm's base pay and benefits programs, the Ownership Program provides a Total Compensation package for all employees. Introduced in 1999, the Ownership Program includes the following:

- Stock Ownership
- Short Term Incentives (cash & stock)

Stock Ownership

The firm, through the Ownership Program, encourages all employees to own stock.

Short Term Incentive (STI)

The Ownership Program features an annual cash and stock incentive program in which all employees are eligible to participate. However, eligibility does not establish an entitlement; each individual's contribution, and the firm's financial performance, will determine whether incentives will be paid. The program's incentive targets are based on market data.

PERFORMANCE AND SALARY REVIEWS

A formal job performance and salary review are recommended annually to evaluate the growth and advancement of each member of the firm. You would be considered in the salary review made at the end of 2006 with any resulting change in salary taking effect in January of 2007.

Within the first few weeks of your employment, you should meet with **SUPERVISOR** to formally set goals, including Safety. These goals would serve as benchmarks against which to measure your performance for 2006.

BENEFITS

Included in this package is information on our benefits program. The program provides employees an opportunity to select the medical, dental, and group life benefit plans that meet their individual needs. Employees may also participate in two Flexible Spending Accounts (Dependent Care and Health Care) and are eligible for services provided through our Employee Assistance Program.

You would be eligible for Paid Time Off (PTO), a bank of accrued hours that you manage and use at your own discretion for whatever needs you have, (i.e., vacation, sick, appointments, etc.). You would initially accrue 17 eight-hour days of PTO per year. You would also receive 7 paid holidays each year (New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, and Christmas Day), and 1 floating holiday.

The option of alternative work arrangements is an additional benefit offered by the firm. Approval is at the discretion of individual managers and is based on client needs, business conditions and operational demands.

Retirement Benefits

During your first month of employment, you may choose to have part of your salary placed, on a before-tax basis, in the CH2M HILL Tax Deferred Savings Plan (401(k)). The deductions would be effective on the first pay period following receipt of your elections. There is a quarterly employer match. Depending on the firm's performance, CH2M HILL normally matches 50% to 100% of the first 4% of your base pay that you contribute to the Retirement and Tax-Deferred Savings Plan (401(k)).

To further assist you in retirement planning, the firm will invest 2 percent of your base salary in a Defined Contribution Retirement Plan. This contribution will normally be made in CH2M HILL stock. Eligibility for the plan begins the first month after you've completed 1 year of service, providing you work 1,000 hours in your first 12 months or in a subsequent calendar year. A 6-year vesting schedule applies to the plan.

Domestic Partner Benefits

CH2M HILL will provide equal benefits for employees with spouses and for employees with domestic partners. Domestic partner is defined as, any two adults who have chosen to share one another's lives in an intimate and committed relationship of mutual caring, who live together, and who have agreed to be jointly responsible for basic living expenses incurred during the domestic partnership. Domestic partners must be registered with a governmental entity pursuant to state or local law authorizing such registration or with an internal registry maintained by an employer of at least one of the domestic partners. CH2M HILL will maintain an internal registry, and employees will be required to complete

an affidavit at the time of enrollment. Please see your Human Resource Representative for details.

HEALTH AND SAFETY

It is CH2M HILL's objective to consistently deliver our services in a safe and environmentally conscious manner. We believe that safety is a shared responsibility, and as such all of our staff are expected to implement our safety policies, procedures, and processes. If you have any questions about our safety program, ask your supervisor, health and safety manager, or visit the Internal Web page.

PROFESSIONAL DEVELOPMENT

CH2M HILL values the professional development of its employees. As such, it sustains an internal learning program aligned with the firm's core business; it also provides support, upon approval, for employees' participation in external learning events. Finally, the firm reimburses eligible employees for state professional engineering licenses. National professional society dues are a separate item for which reimbursement will be considered on a case-by-case basis.

EMPLOYMENT STATUS

My employment with CH2M HILL is not subject to a contract of employment restricting the parties' complete freedom to terminate the employment relationship. I acknowledge and agree that my employment with CH2M HILL is of an indefinite duration and is in all respects terminable "at will." This means that CH2M HILL or I may at any time, with or without cause, with or without notice, for any reason, good or bad, or for no reason at all, and with or without procedural formality, terminate employment. The "at will" relationship cannot be changed except in writing, signed by both me and the following two designated officials of CH2M HILL: (1) the President or the appropriate Business Group President, and (2) the Senior Vice President of Human Resources. Commitments to the contrary (either written or verbal) made by individuals other than those designated shall not be relied upon by me and are void.

CH2M HILL retains the right at all times to change or modify any aspects of my employment (including, by way of example only, my job responsibilities, my job location, my pay and benefits) or company policies, practices, benefits programs, compensation, management processes, handbooks, manuals, guides, or other company documents, communications, or statements (written or verbal). The preceding are not contracts (express or implied), nor are they guarantees or commitments of any particular kind of treatment, management process, benefit, or practice.

This offer is contingent upon successfully passing a drug test. Enclosed for your review and signature is CH2M HILL's Drug-Free Workplace Policy Acknowledgement and Consent form. Also enclosed for your information is "Attachment 4: Frequently Asked Questions" concerning the company's Alcohol and Substance Abuse Policy. The entire Drug-Free Workplace Standard of Practice (SOP HSE- 105) is posted on the Virtual Office and is available through the Human Resources representative identified in your offer letter.

This offer is **further** contingent upon compliance with the Immigration Reform and Control Act of 1986, as amended ("Act"). The Act requires you to establish your identity and

employment eligibility by completing the enclosed I-9 Employment Eligibility Verification form and presenting the required documents (as requested on the form) to the firm's representative on your first day of employment.

Finally, as a condition of employment, you would be required to review and return a signed copy of the firm's "Business Conduct Agreement" and "Employee Administration Agreement" on your first day of work.

I accept the offer of employment as generally outlined in the attached letter and as more particularly explained in the enclosed materials. In addition, I acknowledge my "at will" employment status, which is explained in the above-stated paragraphs entitled 'Employment Status'.

Signature

Date



Drug-Free Workplace
Standard of Practice HSE-105

Attachment 3: Subcontractor Minimum Criteria for Drug-Free Workplace Program

Mandatory DFWP Components and Criteria

Policy Statement

A policy statement detailing prohibited conduct and ramifications including:

- Illegal drug use, or any use of drugs, controlled substances or alcohol that impairs an employee's work performance or behavior are prohibited
- No involvement in the manufacture, distribution, dispensation, possession, sale or use of illegal drugs in the workplace
- Failing to fully cooperate with any aspect of the DFWP is prohibited
- Failing to promptly report convictions of alcohol or drug related criminal offense, if the conviction relates to work, unless otherwise restricted by state law is prohibited
- Disciplinary actions

Subcontractor Management

All subcontractors and their lower-tiered subcontractors are required to implement and comply with this Minimum Criteria for DFWP.

Subcontractors must certify that they have in place and enforce a DFWP for their employees and their lower-tiered subcontractors, that meets this Minimum Criteria for DFWP.

Subcontractor and their lower-tiered subcontractors that work on a CH2M HILL project must pass a 5-panel Non DOT pre-assignment drug test (negative drug test result), within 30 days prior to mobilizing to the project site.

If subcontractor or lower-tiered subcontractor's employee tests positive while working on CH2M HILL project, CH2M HILL must be notified of test result within 24 hours and provide written documentation that the employee has been removed from the site.

Subcontractor employees testing positive while working on a CH2M HILL project, will be removed from the project and not allowed to return for a minimum of six (6) months and then only upon providing a negative drug screen result. Subcontractors will determine the appropriate disciplinary action that applies to the affected employee.

Subcontractor is responsible for maintaining their own records. CH2M HILL reserves the right to audit Subcontractor's program and records at any time, with failure to implement

and comply with the Minimum DFWP Criteria for Subcontractors grounds for breach of contract and penalties up to termination of contract.

Prescription and Non-Prescription Drugs

Employees using prescription and/or non-prescription drugs that could impair their functions on the project are required to notify the employer prior to working on the project, in accordance with applicable American's Disability Act (ADA) federal regulations.

Failure to report prescription and/or non prescription drugs as required above, illegally obtaining the substance, or use which is inconsistent with prescription or label may be subject to disciplinary action.

Drug and Alcohol Testing

General Requirements

Subcontractors must utilize SAMSHA-certified laboratories for all drugs and alcohol testing conducted under CH2MHILL contract requirements.

Only SAMSHA-certified laboratories with Chain of Custody procedures in place to ensure continuity in specimen handling will provide drug screening analysis, while meeting all federal, state and local licensing requirements.

CH2M HILL specified collection facilities must utilize DHHS specimen collection procedures.

Employees who refuse to submit to drug or alcohol testing will be treated as if they tested positive and will be disciplined accordingly.

All non-negative drug screening results must be reviewed by a licensed Medical Review Officer.

Prior to drug or alcohol testing, the employee must sign a consent form. Copies of this form must be maintained on file by HR, the DFWP Coordinator or by the Subcontractor.

Pre-employment, pre-assignment and random testing will only entail drug testing, while post incident and for cause or reasonable suspicion testing must include drug and alcohol testing.

Drug and Alcohol Testing Criteria

Drug and alcohol testing will be conducted for the substances listed below, consistent with National Institute for Drug Abuse (NIDA) 5 panel Drug and Alcohol testing protocols as required by Federal Motor Carrier Safety Administration (FMCSA) Alcohol and Drug Testing Regulations.

If the Screen Threshold Level is exceeded, as analyzed by the Enzyme Multiplied Immunoassay Technique (EMIT), the test will be considered as a "presumptively positive" and submitted for confirmation testing and MRO review. Each presumptive positive result must be confirmed by a second analysis using Gas Chromatography/Mass Spectrometry (GC/MS). If the Confirmation Threshold Level is exceeded using GC/MS, the result will be

reported as “pending”. If the donor cannot provide a valid prescription, as verified by subsequent interview with the MRO, the result will be reported as a “positive”.

Table 1: Drug and Alcohol Panel Screening and Confirmation Levels

Substance	Screening Threshold Level (EMIT)	Confirmation Threshold Level (GC/MS)
Amphetamines	1000 ng/ml	500 ng/ml
Cocaine Metabolite	300 ng/ml	150 ng/ml
Opiates	2000 ng/ml	2000 ng/ml
Phencyclidine (PCP)	25 ng/ml	25 ng/ml
Marijuana (THC)	50 ng/ml	15 ng/ml
Alcohol, Ethyl	0.02 gm/dl	0.04 gm/dl

Alcohol testing will be performed in accordance with the FMCSA Alcohol & Drug Testing Regulations using breath alcohol testing equipment and procedures. Two alcohol tests are required to determine if a person has a prohibited alcohol concentration. A screening test is conducted first, with any result less than 0.02 gm/dl considered a “negative” result. If the alcohol concentration is greater than 0.02 gm/dl, a second confirmation test must be conducted. Confirmation breath alcohol tests greater than 0.04 gm/dl are considered a “positive” result.

Only a Breath Alcohol Technician (BAT) may be used for breath alcohol testing, unless applicable state licensing or other requirements mandate blood tests or unless testing facilities are not available for breath sampling. When blood alcohol testing is used, each presumptive positive result must be confirmed by a second analysis using a GC/MS.

Pre-Assignment Testing

Pre-assignment drug testing also applies to all subcontractors and their lower-tiered subcontractors that work on CH2M HILL projects.

Subcontractor and their lower-tiered subcontractors that work on a CH2M HILL project must pass a pre-assignment drug test (negative drug test result), within 30 days prior to mobilizing to the project site.

Subcontractor and their lower tiered subcontractor’s employees who do not successfully pass the drug test may be reconsidered for assignment to a CH2M HILL project after 6 months and only after passing a pre-assignment drug test.

Random Drug Testing

A minimum of 5% of the workforce assigned to CH2M HILL projects will be sampled on a monthly basis. Random sampling rates may differ if required by governmental, regulatory body or client demands. Random sampling rates may be increased on a project, based on increased frequency of positive drug test results, as determined by the DFWPA for CH2M HILL Member Company. Random selection process must be implemented that ensures employees have an equal chance of being selected.

When random testing is performed, no advance notice of testing will be given, and employees who are selected will be required to submit to testing, as soon as practical after being notified, but within the same day of random testing notification. If the employee does not submit to the test on the same day that the notice is received, the employee must be removed from the project.

Post Incident Testing

Post incident drug and alcohol testing is required following a work-related injury requiring off-site medical attention, any incident resulting in property damage over US \$5,000, or other incident classified as a serious near miss injury on a CH2M HILL project.

Post-incident testing may also be required under other circumstances as dictated by the CH2M HILL DFWPA.

Provisions for “Hospital Kits” must be provided to DFWP covered projects for serious injuries that require hospital, ambulance or paramedic care, so that the drug test specimen may be properly collected.

For Cause or Reasonable Suspicion Testing

For cause and reasonable suspicion testing applies when CH2M HILL believes there is cause or reasonable suspicion that a subcontractor employee has taken drugs or consumed alcohol while at work, or returned to duty with drugs or alcohol in their body.

Subcontractor employees who are required to submit to reasonable suspicion testing must submit to the test immediately after the determination has been made and are prohibited from transporting themselves to the collection site.

For cause testing will include both drug and alcohol testing.

The Subcontractor must maintain written documentation that supports the need for reasonable suspicion testing.

Testing Process

Notification of results

A determination will be made whether the sample is negative or positive based on the criteria provided in the Drug and Alcohol panel with confirmation threshold limits (provided Table 1) and information provided by the employee on prescription and nonprescription medications. All non-negative results will be reviewed by an MRO.

The MRO notifies the subcontractor's DFWPA of all test results and in the case of a positive test result within 24 hours of a confirmed positive result.

Employee's drug screen result must be kept confidential. Only individuals with a work-related need-to-know will be given the results of an employee.

Retesting

A "dilute" sample will require the employee to submit to an escorted retest without prior warning. The employee's supervisor will escort the employee to the collection site for re-sampling.

When an employee's sample cannot be analyzed because the MRO suspects the sample has been "tampered" with, the employee will be escorted and the test must be observed.

A refusal to retest under these conditions will be considered a positive and disciplined accordingly, up to and including dismissal.

Searches and Inspections

The subcontractor and CH2M HILL must be able to conduct searches of project locations (vehicles, lockers, desks, filing cabinets, or equipment owned or being operated by Subcontractor personnel) and employee's personal property brought onto project locations (briefcases, purses, backpacks, coats or vehicles).

CH2M HILL will only conduct searches and inspections of their employees, while subcontractor will only conduct searches and inspections of their employees, based on reasonable suspicion and cause that an affected employee may be in violation of the CH2M HILL DFWP Policy.

CH2M HILL must be notified prior to conducting a search. CH2M HILL must notify subcontractor (project manager or site supervisor) of reasonable suspicion or cause to conduct a search of a subcontractor's employee.

Employee must sign a search consent and documentation form prior to having a search conducted of the employee's personal property. The Member Company DFWPA or the subcontractor is responsible for maintaining this form which will also document findings of the search.

A refusal to submit to, or cooperate with a search, will result in immediate discipline, including dismissal or, in the case of a subcontractor's employee, their removal from the project site.

Disciplinary Action

Subcontractor's employees who test positive for drugs or alcohol will be immediately removed from the project. Subcontractors will determine the appropriate disciplinary action that applies to the affected employee.

Drug Program Service Provider

All non-negative drug screen results must be reviewed by a licensed Medical Review Officer (MRO). When "Quick Test" panels are employed on a project, all non-negative drug screening results must be reviewed by a licensed MRO.

The laboratory providing drug screen analysis must meet all federal, state and local licensing requirements to provide drug screen analysis.

Training Requirements

Employees and supervisors must be provided with initial and periodic drug-free workplace and alcohol education awareness training.

Recordkeeping

Subcontractors are required to maintain records associated with their DFWP on their own employees and lower tier subcontractor employees.

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Attachment 4: CH2M HILL Drug Testing Consortium

Purpose:	For Subcontractors who do not have a drug testing program or whose program does not meet CH2M HILL's Minimum Criteria (see SOP HSE-105, Attachment 3).
Benefits:	<ul style="list-style-type: none">• Employees of small companies are grouped together with employees of other Subcontractors in the Consortium resulting in fewer repeat random tests for their employees.• Lower costs.• The tests can be paid for using a credit card number.
Contract:	Contract is between the Subcontractor and HRPLUS. CH2M HILL is not a party to this agreement. HRPLUS will set up a separate account for Subcontractor. Charges are billed directly to the Sub (they can even use a credit card).
Test Results:	Subcontractor will receive results directly from HRPLUS/Stat America and will forward a confirmation letter to CH2M HILL, on company letterhead, signed by an officer of the company, listing those employees who have tested and are available. Do not send the test results.
Requirements:	<ul style="list-style-type: none">• 5-panel drug test (and alcohol if required by CH2M HILL's Client) (Baseline pre-assignment test required after which employees will be subject to random testing)• All non-negative results are reviewed by a licensed Medical Review Officer (MRO)• The laboratory providing analysis meets all federal, state and local licensing requirements• Pre-Assignment drug test required within 30 days prior to working on our site (unless employee is currently in an ongoing Random Program)• Site crew must participate in a monthly Random Testing Program which tests 5% of the Program participants• Post Incident testing• For Cause or Reasonable Suspicion testing
Costs:	<ul style="list-style-type: none">• No fee to sign up• No fee for random pull• In-network thru Quest or LabCorp: \$27.10 per test (drugs only)• Quest 3rd party Preferred network: \$32.10 per test (drugs only)• Out-of-network tests (3rd party): \$48.10 per test (drugs only) (In network or out of network to be determined by Subcontractor's location)
Randoms:	<u>On a monthly basis</u> , Subcontractor will provide HRPLUS with an employee list that includes all Sub's employees working on CH2M HILL jobsites.



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Attachment 5: Drug Clause Subcontractor Language

Drug-Free Work Place Program

Subcontractor has certified to CH2M HILL that it implements a drug policy which meets CH2M HILL's minimum standards for a drug-free workplace, which standards are incorporated into the Subcontract by this reference ("Standards"). CH2M HILL may require the Subcontractor to conduct reasonable searches of Subcontractor's employees' (personal property brought onto project locations) and employees of its lower tier subcontractors and suppliers and may require and receive the results of a 5-panel drug screen and blood alcohol tests for any employee of Subcontractor or its lower tier subcontractors. Any employee of Subcontractor, its lower tier subcontractors or suppliers found to possess or be under the influence of an article prohibited by the Standards, or refusing to test or to consent to a reasonable search by CH2M HILL may, in CH2M HILL's sole discretion, be immediately removed from the Project site and denied future access. Subcontractor agrees to enforce its drug policy and to bind its lower tier subcontractors to its policy and to the provisions of this paragraph. Any violation of the requirements of this paragraph may be grounds for withholding payment to Subcontractor or for termination for default pursuant to Article 10. Nothing in this paragraph shall require CH2M HILL to undertake testing or searches.



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Attachment 6: Frequently Asked Questions

What is CH2M HILL's Drug and Alcohol Policy? CH2M HILL does not tolerate drug or alcohol use, and as such a policy has been established whereby its employees and subcontractors shall not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited except where alcohol on premises is allowed on limited occasions with approval by office managers or Project Managers. Any CH2M HILL or subcontractor employee's alcohol or substance involvement that adversely affects performance or the work environment will not be tolerated. Being under the influence of illegal drugs, controlled substances, or alcohol while conducting business on behalf of the company, whether or not consumed during working hours or on company premises, is prohibited. Any violation of these prohibitions may result in discipline or immediate discharge.

What are the effects and consequences of controlled substances use on personal health, safety, and work environment? Drug users are 3.6 times more likely to injure themselves or other workers in an accident and 5 times more likely to injure themselves off of the job. Some of the physical effects of alcohol include sleeplessness, chronic fatigue, and loss of weight and appetite. Marijuana slows physical reflexes and reaction times, cuts concentration, distorts space and distance, which affects depth perception, dulls awareness levels and impairs judgement in both physical and mental settings. Long-term use can cause "burnout", or a lethargic attitude. Amphetamine abuse can result in brain damage as well as addiction and possible overdose. Cocaine increases heart rate and blood pressure, and can cause inflammation of the nostrils, paranoia, seizures, heart attacks, collapse and death.

How is it determined if I need to be tested? The necessity for testing will be determined by the projects the employee works on. Certain clients require drug or alcohol testing as do certain types of projects (such as, CCI or MR owned projects). All CCI, CMS and MR group employees regardless of job function participate in the drug program. When testing is required, the employee may have to submit to preemployment or preassignment, random, or post-incident testing when reasonable suspicion exists of a violation of CH2M HILL's Drug-Free Workplace Program, or when returning to work after participating in a rehabilitation program.

Who is responsible for paying for drug and alcohol testing? Each employer is responsible for paying for drug and alcohol testing when required.

Where do I charge my time? If you are assigned to a project, your labor is to be charged to that project. If you are not assigned to a specific project, you will charge your time to your organization's drug testing overhead number or your group's overhead number.

Will I need to attend training associated with the drug program? Yes, all employees included in the drug program are required to take the Drug Free Workplace online training initially at the time of their baseline test as well as an annual refresher.

What will I be tested for? Drug testing may include, but is not limited to, the following compounds. Levels on initially screened urine specimens which are equal to or exceed the following will be considered as presumptively positive and submitted for confirmation testing. Each presumptive positive result must be confirmed by a second analysis using the Gas Chromatography/Mass Spectrometry (GC/MS) method.

	EMIT	GC/MS
Amphetamines	1,000 ng/ml	500 ng/ml
Marijuana (THC).....	50 ng/ml	15 ng/ml
Cocaine	300 ng/ml	150 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml
Opiates.....	2000 ng/ml	2000 ng/ml

An employee is considered to be positive for alcohol if their breath or blood alcohol level is .04 or higher. Breath testing will be used unless applicable state licensing or other requirements mandate blood tests or unless testing facilities are not available for breath sampling. When blood testing is used, each presumptive positive result must be confirmed by a second analysis using a GC/MS.

How will samples be collected? Drugs are tested in your urine, while alcohol can be tested in either breath or blood. When allowed by state law, and if the collection facilities are available, we will collect alcohol samples via breath.

What happens if my test result is positive? Current employees who test positive may be disciplined, up to and including dismissal.

What about positive results on a pre-employment test? Potential new hires who fail a pre-employment drug test will be eliminated from consideration for current employment except under specific situations approved by the DFWPA, PM or CM, legal department and HR Manager. A candidate will also be eliminated from consideration for tampering with, altering, or attempting to create a false negative result. Applicants who do not successfully pass the drug or alcohol test may be reconsidered for employment after 6 months.

If my test result is positive and I am offered Employee Assistance (rehabilitation), what am I required to do? If you are offered the Employee Assistance Program and choose to go through that program, you are making a commitment to the firm to complete the entire treatment program. The EAP will develop a customized treatment program based on your individual situation which could include individual counseling, group therapy, and follow-up care. The entire program must be completed in accordance with the EAP time schedule in order to continue your employment with CH2M HILL. The EAP will report to the HR Manager on a continual basis about your progress and compliance with the program.

If I choose to go through the EAP after testing positive, can I still work on projects where drug testing is required? Work restrictions, determined by the DFWPA, in consultation with the employee's Supervisor, Legal and HR, will be outlined in the employee's Return to Work Agreement. If the employee tests negative for six months as part of their rehabilitation testing program, the work restrictions will be removed.

I have heard that certain foods will cause my test to be positive. Is that true? Poppy seeds will not register as a positive, but hemp products may. Positive results as a consequence of

using hemp products will be considered a "positive." Employees who test positive will be disciplined, up to and including dismissal.

Will I be considered a positive if I'm using marijuana for medical reasons? Yes.

Marijuana is listed as an illegal drug by the federal government and is therefore prohibited under our policy.

What happens if my test result is inconclusive (such as a dilute sample)? An employee who has a test result that is reported to the DFWPA as inconclusive will be immediately required to provide another sample. The employee will be required to submit to an escorted test without prior warning. If these procedures are followed and the second test comes back "dilute", the results will be considered negative. A refusal to retest under these conditions will be considered a positive result and disciplined accordingly.

What happens if I refuse a drug or alcohol test? Employees who refuse a test will be treated as positive and this refusal could result in disciplinary action, up to and including dismissal.

How long will it take to know the result of a drug or alcohol test? Typically we receive the negative test results within 24 to 48 hours. Positive results can take a little longer because the results have to be validated before they are reported.

Aren't there certain foods that can give a positive result? Yes. They will be considered during the sample analysis.

How do I make sure that one of my nonprescription or prescription drugs does not make me fail a drug or alcohol test? You are required to inform the Drug Free Workplace Administrator (DFWPA) or your Supervisor of all drugs that may affect your ability to perform the essential functions of your job and that pose a direct threat to your health and safety or that of others. If the test result is positive, the MRO will contact you to discuss the results and the possible legitimate reasons why the drug screen could be positive.

How are people selected for random testing? A minimum of 5 percent of the workforce will be sampled on a monthly basis. A random selection process will be implemented by the DFWPA to ensure employees in the group selected for testing have an equal chance of being selected.

How will I be notified I've been selected for a random test? You will receive notification that you have been selected along with paperwork (Chain of Custody (COC) form and Instructions) that indicates where you need to go for testing. You will need to test the same day you receive notification.

What happens if I cannot test within the specified timeframe? If random testing will have undue impact on your project or you are traveling, the DFWPA can extend the time required for submitting to the test. You must submit to the test the day notification is received OR must contact the DFWPA to make alternate arrangements.

What does "for cause" or "reasonable suspicion" mean? These terms mean that there is reason to believe someone is under the influence of drugs or alcohol. When this happens, a procedure is in place to document why this is believed.

What should I do if I feel like I'm being singled out? If you feel that you are being singled out, talk to your supervisor unless this person is the one you are worried about. If you

believe your supervisor is singling you out, contact the HRM listed in your project-specific safety plan and discuss the situation with them.

If I am an INC employee and work on CCI or MR projects, when do I get tested? As an INC employee, you are subject to the drug testing program if you conduct any field work on CCI or MR projects or assigned to the CMS Group, regardless of the duration of these activities. You will be required to do a Pre-Assignment drug test prior to being on site and will be subject to random drug testing as long as you continue to do field work on CCI or MR projects.

If I am an INC employee assigned to the CMS Group, when do I get tested? You will be required to do a Pre-Employment drug screen after which you will be subject to random drug testing as long as you remain in the Group.

Do any other INC employees need to drug test? Yes, INC employees working on projects where the Client requires drug testing are subject to the CH2M HILL drug program. We comply with our Clients' requirements to determine which of these employees must test.

What is the definition of "field work"? Field work is considered to be any work-related activity conducted outside of the office environment. This can be as minor as a "couple-of-day" engineering evaluation or walk-through at the client's facility, or an occasional check on someone else's field work. However, a "windshield" tour, or escorted tour for a proposal, or similar purpose would not be considered field work.

What is the definition of "Site Visitor"? Site visitors are employees who visit a site for a day or less and who are accompanied by a site manager/supervisor. Site visitors are employees who observe the project and are not exposed to significant HS&E hazards. The DFWPA must be involved in determining whether an employee is considered a site visitor. Site visitors are not required to be drug tested but must be escorted by someone who has been tested.

What should I do if I test positive and I think it's a mistake? You should contact the MRO and the DFWPA or the HRM immediately (but no later than 5 working days) after you receive your test results. You have a right to contest the result and have the original sample re-tested by another licensed and certified laboratory of your choice. The costs of such testing will be your responsibility but will be reimbursed if the original sample is found to be negative as a result of the retest.

Can my personal items be searched? Yes, but you will not be patted down during the search. Employees will not be touched in any way. The search may include looking in any of your personal belongings such as lunch boxes, tool boxes, lockers, or cars, and asking you to empty your pockets, identify suspicious bulges, etc. Before your personal belongings are searched, you will be asked to sign a consent form. If you refuse, you will face disciplinary action up to and including dismissal.

When will searches be conducted? Searches of company property (including vehicles, lockers, desks, filing cabinets, etc.) or employees' personal property (briefcases, purses, backpacks, coats, vehicles, etc.) will be based on "cause" or "reasonable suspicion" that the employee is buying, selling, transporting, using, or in possession of illegal drugs or alcohol on company property, or is otherwise in violation of the drug-free workplace policy.

Are managers and supervisors drug and alcohol tested? Yes. When drug testing is required, no employees are excluded from the testing. For example, all CCI employees; all INC employees in the CMS group or INC employees assigned to conduct field work on CCI or MR projects; and all subcontractor personnel working on CCI or MR projects are also required to submit to drug and alcohol testing. Supervisors and managers have the same chance of being randomly selected for drug and alcohol testing as everyone else.

How do you ensure that records are kept confidential? These records, as well as other documentation associated with this program, are maintained in confidential files and distribution is kept to a minimum.

What do we do if we need someone on an emergency basis and we have not received a drug and alcohol clearance? Staff can be approved by the PM or CM (in consultation with the DFWPA) on an emergency basis. The individual will be employed pending the results of the drug screen. If the screen results are negative, the employee will continue working. If the screen results are positive, the employee will be immediately taken off the project.

How do I contact the employee assistance program? The phone number is 1.800.888.2273.

Who is the oversight physician? The oversight physician, known as the MRO (Medical Review Officer) is as follows:

	MRO
Company Name	HRPLUS
Point of Contact	Dr. Kit Brekhus
Phone Number	888-644-7828 Option 4
Address	2902 Evergreen Parkway Evergreen, CO 80439

Attachment 7: Drug and Alcohol Testing Criteria

When drug testing is required, it may include, but is not limited to, the following compounds. Levels on initially screened urine specimens, which are equal to or exceed the following, will be considered as presumptively positive and submitted for confirmation testing. Each presumptive positive result must be confirmed by a second analysis using the Gas Chromatography/Mass Spectrometry (GC/MS) method.

	EMIT	GC/MS
Amphetamines	1,000 ng/ml	500 ng/ml
Marijuana (THC).....	50 ng/ml	15 ng/ml
Cocaine	300 ng/ml	150 ng/ml
Phencyclidine (PCP)	25 ng/ml	25 ng/ml
Opiates	2000ng/ml	2000ng/ml
Nitrites	Negative	

An employee is considered to be positive for alcohol if their breath or blood alcohol level is 0.04 or higher. Breath testing will be used unless applicable state licensing or other requirements mandate blood tests or unless testing facilities are not available for breath sampling. When blood testing is used, each presumptive positive result must be confirmed by a second analysis using a GC/MS.



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Attachment 8: Notification of a Drug-Free Workplace Program

NOTICE TO EMPLOYEES AND VISITORS

The following items are strictly prohibited on or in any CH2M HILL vehicles, equipment, properties, job sites, work areas, and work locations:

- Illegal and unauthorized drugs and substances, look-alikes, and synthetic drugs
- Unauthorized alcoholic beverages
- Drug paraphernalia
- Legally prescribed drugs in excess of reasonable dosage requirements
- Contraband
- Stolen property
- Firearms
- Weapons (Except in performance of MR projects)
- Ammunition (Except in performance of MR projects)
- Explosives (Except in performance of MR projects)
- Any other hazardous substances or articles

Using, possessing, or concealing any of the above-mentioned unauthorized items is not allowed and may result in disciplinary action up to and including dismissal.



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Attachment 9: Certification of Compliant Drug Policy

Pursuant to CH2M HILL policy and as a condition of award of a subcontract, Subcontractor must have in place and enforce a drug policy that is at least as stringent as CH2M HILL's drug policy requirements. Subcontractor hereby certifies that it had adopted and agrees to implement at all times during the term of any subcontract awarded to Subcontractor by CH2M HILL a policy that meets or exceeds CH2M HILL's Minimum Standards for Drug Free Workplace Program.

Subcontractor: _____

Certification by: _____

Print Name: _____

Date of Certification: _____



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Attachment 10: Recordkeeping Requirements

Each employer is responsible for maintaining their own drug-free workplace records; however, CH2M HILL reserves the right to audit subcontractor's records at any time.

All medical records, including those listed below, are maintained by the MRO.

- Test results showing all substances testing positive (MRO)

Forms necessary to administer the program and documentation of program violations (except test results), including those listed below, will be maintained in the employee's corporate HR file or in the DFWPA's file. The person typically responsible for verifying that the records have been routed is listed in parenthesis after each document.

- Policy Acknowledgement and Consent Form for new staff (HRM)
- Policy Acknowledgement and Consent Forms (DFWPA)
- For Cause and Reasonable Suspicion Documentation Form (SC, PM or CM and DFWPA)
- Search Consent and Documentation Form (SC, PM or CM)
- Notification of drug- or alcohol-related convictions (Employee)
- Summary of test results-positive or negative (DFWPA)

Copies of records, which document a subcontractor's breach of contract or performance issue, will be maintained in the subcontracting files.

The information generated as part of the drug-free workplace program will be treated as confidential, but may be disclosed or released to appropriate parties as necessary to facilitate disciplinary actions, employee assistance programs, incident investigations, legal proceedings, and other associated actions.



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Attachment 11: Drug-Free Workplace Program Project Set-Up Checklist

Action	Responsible Party	Signature	Date Completed
Include drug-free workplace requirements in RFP that meet local, client, and labor requirements	PM/CM or DFWPA		
Contact MRO to establish testing facility and program for site	Elaine Senecal/ORL		
Review and approve subcontractor drug-free workplace program	HSM or DFWPA		
Review contract requirements (client, subcontractor)	PM/CM, Consult with DFWPA if needed		
Review contract requirements to verify CH2M HILL standard Drug-Free Workplace Program is being adopted for project	SC		
Incorporate Drug-Free Workplace Program requirements into site-specific written safety plan	PM/CM, SC, HSM		
Post SOP Attachment 8 at worksite: <i>Notification of a Drug-Free Workplace Program</i>	SC, PM/CM		
Verify that pre-employment or pre-assignment testing has been completed (initial)	PM/CM, or SC		
Verify that pre-employment or pre-assignment testing has been completed (on-going)	SC		
Verify subcontractor's random sampling program meets contract requirements	SC		
Audit subcontractor's compliance with drug-free workplace program	SC		
Approve invoices for drug and alcohol testing	Elaine Senecal/ORL		

This checklist is part of CH2M HILL's Drug-Free Workplace Program described in SOP HSE-105.

HSE-105 VERSION 1 – A11

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Form 1:

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Form 2: Drug and Alcohol Conviction Form

CH2M HILL has a strong commitment to health, safety, and environmental protection (HS&E), and has established an Alcohol and Substance Abuse Policy and a Drug-Free Workplace Program (SOP HSE-105) to help achieve safer work environments.

As part of this program, you are required to notify CH2M HILL of any work-related drug- or alcohol-connected convictions. If you have no information to disclose, indicate that as "none." You must notify your supervisor within 5 calendar days on any drug- or alcohol-related convictions.

Drug- or Alcohol-Related Conviction	Date

By signing below, you are certifying that information provided above is complete and accurate. You are acknowledging that this information which is being relinquished to CH2M HILL or their representatives is for confidential use in determining ability to work safely.

Signature

Social Security Number

Printed Name

Date

Witness Signature

Return completed form to the DFWPA.

This form is part of CH2M HILL's Drug-Free Workplace Program described in SOP HSE-105.



Form 3: Policy Acknowledgement and Consent Form

Policy

CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances or alcohol that impairs an employee's work performance or behavior. CH2M HILL has established a policy whereby its employees and subcontractors shall not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited except where alcohol on premises is allowed on limited occasions with approval by office managers. Any violation of these prohibitions may result in discipline or immediate discharge.

Additional details on CH2M HILL's drug policy can be found in the Employee Handbook, SOP HSE-105, or from the Drug Free Workplace Administrator (DFWPA) or a Human Resources Manager (HRM).

Testing

The necessity for testing will be determined by the projects the employee works on. Certain clients require drug or alcohol testing as do certain types of projects (such as, CCI owned projects). An applicant or employee may have to submit to pre-employment or pre-assignment, random, or post-incident testing when there is cause or reasonable suspicion of a violation of CH2M HILL's Drug-Free Workplace Program, or when returning to work after participating in a rehabilitation program.

Drug testing may include, but is not limited to, the following compounds. Levels on initially screened urine specimens which are equal to or exceed the following will be considered as presumptively positive and submitted for confirmation testing. Each presumptive positive result must be confirmed by a second analysis using the Gas Chromatography/Mass Spectrometry (GC/MS) method.

	EMIT	GC/MS
Amphetamines.....	1,000 ng/ml	500 ng/ml
Marijuana (THC)	50 ng/ml	15 ng/ml
Cocaine.....	300 ng/ml	150 ng/ml
Phencyclidine (PCP).....	25 ng/ml	25 ng/ml
Opiates	2000ng/ml	2000ng/ml

An employee is considered to be positive for alcohol if their breath or blood alcohol level is 0.04 or higher. Breath testing will be used unless applicable state licensing or other requirements mandate blood tests or unless testing facilities are not available for breath sampling. When blood testing is used, each presumptive positive result must be confirmed by a second analysis using a GC/MS.

Employees who have a “diluted” sample will be required to submit to an escorted test without prior warning.

Employees who test positive may be disciplined, up to and including dismissal and employees who refuse a test will be treated as if they tested positive and may be disciplined, up to and including dismissal.

Contesting Results

If an employee wishes to contest their results, they are required to notify the MRO, the Drug-Free Work Place Administrator (DFWPA) and the Human Resources Manager (HRM) in writing as soon as possible, but no later than 5 working days after notification of the test results. When notifying CH2M HILL that the results are being contested, the employee must provide, in writing, the reasons why the results are being contested. A portion of the original sample will be tested by an approved laboratory, at the employee’s expense. The employee will be reimbursed if the original sample is found to be negative as a result of the retesting.

If the employee is planning on bringing on administrative or civil action against a laboratory, they are required to notify the MRO.

Medications that can interfere with Drug Testing Results

Employees will be required to inform the oversight physician, known as the MRO, of prescription and nonprescription medications which might affect the employee’s ability to perform the essential functions of their job, pose a direct threat to the health and safety of the employee or that of others, or interfere with their drug or alcohol test results. They can either fax the information to Dr. Jim Ferguson at 301-571-2186 or call him at 800-275-7051 ex. 4603. Employees can also contact the MRO to discuss how medications they are taking may affect a drug test.

Confidentiality

Information and records associated with the CH2M HILL Drug-Free Workplace Program will be treated confidentiality.

Employee Assistance

CH2M HILL’s Employee Assistant Program (EAP) can be contacted by: 1.800.888.2273. Local drug rehabilitation programs will be listed in the site-specific written safety plan.

Employee and Applicant Responsibilities

All employees who fall under the scope of CH2M HILL’s Drug-Free Workplace Program are responsible for following its requirements. Each applicant must sign that they have received an overview of CH2M HILL’s program and agree to its provisions. Employee responsibilities include, but are not limited to, never reporting to work while under the influence of illegal drugs or alcohol, notifying the CCOP of prescription drug and nonprescription medication use that could affect job performance and safety as noted above, and notifying a supervisor of any work-related drug- or alcohol-related convictions within 5 days following the event using the Drug- and Alcohol-Related Convictions Form. In the event that an employee wants to contest their results, they are responsible for notifying the

MRO and laboratory of any administrative or civil actions brought about as the result of contesting their test results.

Employee and Applicant Acknowledgement

By signing below, you are acknowledging that you have been given a copy of the company's drug testing policy, have read and understand the requirements of this policy and program, agree to comply with all of its requirements, and understand that noncompliance with this program can result in dismissal.

You are also authorizing and requesting your prescribing physician(s) to discuss and disclose to CH2M HILL or their representatives any anticipated or normal side effects of medications and prescription drugs that may have an effect on your ability to perform the essential functions of your job or work safely as noted above.

Check One:

☐ New CCI Employee

☐ Other INC (including CMS group), OMI, or IDC Employee

☐ Other (Company Name): _____

Signature

Global Employee Number or SSN

Printed Name

Date

Witness Signature

(Please have someone sign that they did witness you signing this form. Form is invalid without a witness signature.)

Collection site selection will be based on this Zip Code: _____

BEST PHONE NUMBER TO REACH YOU: _____

Return completed form to the DFWPA or HRM.

This form is part of CH2M HILL's Drug-Free Workplace Program described in SOP HSE-105.



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Form 4: For Cause and Reasonable Suspicion Documentation Form

Project or Work Location: _____

Location of Incident: _____

Employee Name: _____ Empl. Number: _____

Date of Observation: _____ Time: _____

Observations Recorded By: _____

DFWPA Consulted: _____

Legal Department Consulted: _____

Contracts Administrator Consulted (Required if subcontractor employee): _____

Additional Witnesses: _____

- | | | |
|---|---|---|
| <input type="checkbox"/> Slurred Speech | <input type="checkbox"/> "Alcohol Breath" | <input type="checkbox"/> Disoriented Behavior |
| <input type="checkbox"/> Dizziness | <input type="checkbox"/> Disorientation | <input type="checkbox"/> Nausea |
| <input type="checkbox"/> Bloodshot Eyes | <input type="checkbox"/> Dilated Pupils | <input type="checkbox"/> Drowsiness |
| <input type="checkbox"/> Other _____ | | |

Description of Behavior/Observation/Incident: _____



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Form 5: Search Consent and Documentation Form

Instructions:

Part 1 of this form is to be completed by the employee prior to a search.

Part 2 is to be completed during the search by the employee conducting the search.

Part 1: Search Consent

CH2M HILL prohibits the use, possession, concealment, transportation or distribution of illegal and unauthorized drugs, alcoholic beverages, and drug paraphernalia while in the course and scope of employment or while on company premises. Further, CH2M HILL's Drug-Free Workplace Program (SOP HSE-105) states that employees, subcontractors, vendors, suppliers or visitors may be asked to submit to a search and inspection of their personal effects including, but not limited to the contents of lockers, baggage, briefcases, boxes, bags, parcels, lunch boxes, food and beverage containers, desks, tool boxes, clothing and vehicles. These searches and inspections will be based only on reasonable suspicion and cause that an affected employee may be in violation of CH2M HILL's DFWP Policy.

By signing below, I consent to a search of my personal effects and agree that unauthorized items that are found become the possession of CH2M HILL for disposition. I understand that if I refuse this search or do not cooperate that it may result in immediate disciplinary action, including dismissal and removal from the project.

Search Subject's Name (Print)

Search Subject's Signature

Witness Signature

Date

Part 2: Search Documentation

Project or Work Location: _____

Name of Employee to be searched : _____

Global Employee Number : _____

Date: _____ Time: _____

Employed By: _____ Position: _____

DFWPA Consulted: _____

HR Manager Consulted: _____

Search Conducted By (include title): _____

Location of Search: _____

Location of Subject During Search: _____

Prohibited Items (include location): _____

Description of Evidence, Items or Substances: _____

Were authorities called? _____ Time: _____

Signature of Person Conducting the Search

Date

Witness Signature

Date

Return completed form to the DFWPA.

This form is part of CH2M HILL's Drug-Free Workplace Program described in SOP HSE-105.



Emergency Planning

Enterprise Standard Operating Procedure HSE-106

1.0 Purpose

The purpose of this Enterprise-wide Standard Operating Procedure (SOP) is to provide the guidelines for the development of Emergency Response Plans (ERP) at CH2M HILL offices and field projects.

2.0 Scope and Application

This Enterprise Standard Operating Procedure (SOP) describes the procedures for developing and implementing an Emergency Response Plan (ERP) by all CH2M HILL legal entities, Business Groups (BGs) projects, Region and Theatre offices that operate in the United States (U.S.) and internationally. This SOP, however, does not provide specific emergency response procedures.

2.1 Applicable Enterprise SOPs

Other applicable Enterprise SOPs include:

- [HSE-111, Incident Notification, Reporting and Investigation](#)

3.0 Definitions

3.1 Emergency

A sudden unforeseen event requiring immediate response and action to protect people, property, or the environment.

4.0 Roles and Responsibilities

4.1 CH2M HILL Employees

CH2M HILL employees are responsible for:

- Being familiar with and following applicable ERP procedures.
- Notifying the Emergency Response Coordinator (ERC) of all emergency conditions.
- Responding as appropriate (e.g., evacuating) upon being alerted by the emergency alarm system or notification from the ERC.

4.2 Emergency Response Coordinator (ERC)

Emergency Response Coordinators are responsible for:

- Coordinating emergency response procedures with building owners or the party controlling the project site.
- Performing pre-emergency planning tasks before starting field project activities.
- Responding to and assuming charge of the emergency on behalf of CH2M HILL until the external emergency response organization or building owner or party controlling the project site assumes command of the situation.
- Notifying internal emergency responders of the location and extent of the emergency and determining when the emergency responders are required to evacuate.
- Determining when to evacuate a building or site in the absence of emergency alarm system activation.
- Notifying external emergency response organizations and providing pertinent emergency information.
- Serving as CH2M HILL's single point-of-contact for all communications while the emergency is taking place and following established emergency communication guidelines as specified in the ERP and this SOP.
- Implementing post-emergency reporting and investigation procedures as outlined in the Incident Reporting and Investigation SOP (HSE-111).

4.3 Emergency Assistants

During a building or site evacuation, emergency assistants are responsible for:

- Assisting non-emergency staff to their designated evacuation assembly areas.
- Accounting for all staff in their area of coverage.
- Reporting any missing persons to the ERC.

4.4 Responsible Environmental Manager (REM)

The Responsible Environmental Manager is responsible for:

Coordinating preparation of contingency plan information required for RCRA facility operations, if required by the project.

- Implementing post-emergency reporting and investigation procedures as outlined in the Incident Reporting and Investigation SOP (HSE-111).

4.5 Internal Emergency Responders

Internal emergency responders are responsible for:

- Providing medical care or fighting fires when it is safe to do so and only to the level of their training.

4.6 Responsible Health and Safety Manager (RHSM)

The responsible Health and Safety Manager is responsible for:

- Verifying ERP information is provided in project plans and completed as part of the office safety program, and ERP implementation in the field as part of routine office or field visits, or by calling the ERC.
- Receiving required emergency information from the ERC.
- Implementing post-emergency reporting and investigation procedures as outlined in the Incident Reporting and Investigation SOP (HSE-111).

4.7 Project Manager

Project Managers are responsible for:

- Ensuring an ERP is prepared as part of the site-specific HSE Plan or Field Site Instruction, and made available and implemented on the job site.
- Ensuring site personnel are familiar with emergency procedures in the ERP.
- Communicating emergency response procedures (e.g., by supplying a copy of the ERP) with the client or the party controlling the project site.

4.8 Facility/Office Manager (FOM)

Facility/Office Managers are responsible for:

- Ensuring an ERP is prepared and evacuation maps are posted in conspicuous locations throughout the office.
- Ensuring site personnel are familiar with emergency procedures in the ERP.
- Coordinating with the ERC emergency response procedures with building owners or the party controlling the project site.
- Coordinating with the ERC, annual drills of the ERP.

5.0 Requirements

5.1 Emergency Plans

Each office and field project is required to develop and implement an ERP. The ERP shall provide location-specific emergency response procedures for planning, notification, response, and communication of emergencies. Attachment 2 provides a list of emergency situations to consider when developing and implementing the ERP that includes:

- Procedures for reporting to external emergency response organizations (e.g., police, fire department, ambulance services, hospitals, rescue services, and hazardous material response services), building or site evacuation, designated evacuation assembly areas, and methods of accounting for staff upon evacuation.
- The names of the ERC, internal emergency responders, emergency assistants, and the alternates for each position in the event the primary member is unavailable.

- Procedures to be followed, when required, by employees who perform defensive actions for an incipient fires, or chemical releases before they evacuate. Employees are not to remain in the office or field project site to operate critical operations during an emergency evacuation.
- The level of training and allowable conditions under which employees identified as emergency responders are able provide medical care, fight incipient stage fires, or provide defensive actions to chemical spills or releases. These employees must exhibit a clear understanding to only respond when it is safe to do so.
- Emergency drills must be performed periodically, but at least once per year. To determine its effectiveness, an evaluation by the ERC must be completed after each drill to identify any problems or concerns for correction.

5.1.1 Office Locations

An office ERP shall be developed and implemented as part of the office safety program. Requirements for the office ERP are as follows:

- Identify at least one ERC for each office location. Offices that have more than one building or multiple floors may require more than one ERC.
- The ERC and FOM shall coordinate emergency response procedures with the facility owner, other facility occupants, and external emergency response organizations.
- Specific emergency procedures for notification, responding, and communicating of emergencies shall be communicated to all office personnel. Floor evacuation plans and assembly areas shall be posted in conspicuous locations throughout each floor of each office building.
- Providing disaster relief supplies (e.g., food and water) may also be considered if deemed necessary for a particular office in the event of a natural emergency (e.g., earthquake, tornado, or hurricane).

5.1.2 Field Project Sites

A field project ERP shall be developed and implemented as part of the project-specific written safety plan as outlined in Section 9 of the site-specific HSE Plan (HSP) or Section 4 of the Field Safety Instructions (FSI).

The Safety Coordinator (SC) is typically assigned the position of ERC unless this responsibility is delegated to another field staff member. The SC shall coordinate emergency response procedures with the facility, other onsite parties, and external emergency response organizations and perform the following pre-emergency planning tasks before starting field activities:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cellular phone).
- Complete and post the Emergency Contacts form provided in Attachment 3. This form is also provided in the HSP and FSI templates.

- Determine whether defensive actions can be safely performed by employees when an incipient fire, chemical spill or release occurs.
- Where appropriate and acceptable to the client, inform emergency room and external emergency response organizations of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle, place hospital directions and map inside, and keep keys in ignition during field activities.
- Inventory and check site emergency equipment and supplies.
- Rehearse the emergency response plan before site activities begin, including driving the route to the hospital.

5.1.3 Fire Prevention Plans

When an office or project stores or handles flammable or combustible materials, the ERP will have a section for fire prevention.

5.1.4 Hazardous Waste Treatment, Storage, and Disposal Facilities

CH2M HILL operations subject to hazardous Waste requirements for treatment, storage or disposal shall include a contingency plan in the ERP. The responsible Environmental Manager (REM) will coordinate preparation of this plan.

5.2 Emergency Notification

The ERP shall contain clear and concise notification procedures for the initial reporting of an emergency event and, when necessary, the notification of external emergency response organizations. Content of the ERP notification procedures must include the following:

- Provide detailed instructions on the actions employees should take when they are the first to observe a potential emergency condition, such as activating the emergency alarm system, contacting external emergency responders directly, informing a specific point of contact, notifying the ERC, or notifying the building owner or party controlling the field project.
- Employees must be briefed on the emergency reporting actions including immediately notifying the ERC.
- To minimize confusion, each office and field project should assign one emergency point-of-contact for the initial reporting of emergency events, such as the ERC or a staff member who is typically present at the office or project site, such as the receptionist. As a contingency, alternate point-of-contacts must be listed. When employees must call external emergency responders directly, the emergency point-of-contact must be notified immediately.
- The notification procedures shall list the detailed instructions on who is responsible and the authority for ensuring that appropriate external emergency response organizations have been notified. Once initial notification is completed to an external responder, the ERC or designee will take command of all additional external communications to reduce multiple calls to the same organization and to prevent potentially conflicting information from being provided.
- External responders shall be provided with all pertinent information regarding the emergency, directions to the office or field project, and a telephone number where they can

obtain additional information if required. When the site of the emergency location is not obvious, a sentinel will be assigned and positioned outside the office of the field project location to guide the responders.

- Offices must coordinate notification procedures with the building owner, and for field project locations coordinated with the party responsible for the site (e.g., client, general contractor).

For a serious incident, follow the procedures in HSE SOP 111, Incident Reporting & Investigation, Section 5.3, Serious Incidents that include:

- Work related death of employee or CH2M HILL subcontractor
- Life threatening injury or illness of employee or CH2M HILL subcontractor
- Kidnap/missing person (employee or CH2M HILL subcontractor)
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$500,000 in property damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.
- Event that may not have any significant real impact but will attract media attention.
- Significant near miss or negative trend that will likely require work suspension or significant company resources to resolve.

5.3 Emergency Response

The ERP shall provide emergency response procedures that establish a clear chain of command over emergency events and identify the actions employees must take in the event of an emergency that may affect the entire building or project site to include the following:

- For office locations, the chain of command must be coordinated with the building owner. The ERC shall assume charge of the emergency until the building owner or external emergency response organization takes over command of the situation.
- For field project locations, the chain of command must be coordinated with the party controlling the site (e.g., client, general contractor).
- ERC responsibilities may be limited to verifying that CH2M HILL employees have evacuated to a safe location and are accounted for upon evacuation. When CH2M HILL is responsible for controlling the site, the ERC shall assume charge of the emergency until the external emergency response organization takes over command of the situation.
- Identify and map the building or site evacuation routes, designated assembly areas, and list the process for accounting of employees. In the event of an emergency that may effect the entire building or project site, employees who are not assigned emergency responsibilities will be notified to evacuate the building or site (if safe to do so) according to the response procedures. The ERC shall determine when to evacuate the building or site in the absence of emergency alarm system activation.

- Emergency Assistants and internal emergency responders may be assigned and trained to assist with response activities, depending on the size of the location and the number of employees. The emergency assistants guide employees to their designated evacuation assembly areas and account for all employees in their area of coverage by conducting a walk-through, if conditions warrant, and reporting any unaccounted employees unaccounted to the ERC.
- Internal emergency responders are identified to provide medical care or to fight incipient stage fires to their level of training, and only when it is safe to do so. The ERC shall notify the internal emergency responders of the location and extent of the situation and determine when the responders are required to evacuate.
- When CH2M HILL staff are expected to be involved in additional emergency response actions (e.g., isolating equipment, containing spills, attempting rescue), the specific responsibilities shall be clearly detailed in the ERP, and communicated to the affected staff who will receive the appropriate level of training on how to implement these procedures.

5.4 Emergency Communication

The ERP shall describe the procedures for communications of emergency events, including serious incidents with onsite personnel (CH2M HILL employees, subcontractors, client, and other facility occupants), CH2M HILL personnel (project manager, regional and business group staff, area office manager, HSE staff, and corporate staff), external emergency response organizations, and other external parties (regulatory authorities, lawyers, and the press).

The ERC shall be in charge of all communications while the emergency event is taking place. Other than responding to immediate external emergency response organizations, the ERC shall not communicate with other external parties, third-party and media inquiries, without first conferring with the RHSM or other internal contacts such as PM, FOM, or the Legal and Insurance Department representatives.

For media inquiries, the RHSM must immediately notify the Corporate Strategic Communications representative. Guidance and approval will be obtained from LID, Risk Management for workers compensation, and/or other appropriate corporate staff.

6.0 Training Requirements

All employees must be briefed on the office and/or project Emergency Response Plan (ERP) applicable to them when the ERP is developed, revised, or the employee's responsibilities change for an office or project where the employee resides or is assigned.

Employees will be briefed on the ERP in the following ways:

- The office ERP can be reviewed by the Human Resources Representative or the employee's supervisor as part of the employee's company induction or new employee orientation process.
- The SC can review the project ERP with the employee when he/she first arrives on site as part of the project orientation.

- When ERP revisions occur, employees will be notified by the appointed office or project ERC.

7.0 Recordkeeping

Documentation of ERP drills will be maintained with the office or project files for a minimum of 5 years. Actual ERP actions will be maintained in the HITS database.

All emergency response plan actions, drills and actual events, must be assessed and documented. Incidents involving ERP implementation must be reported and investigated using the incident report form (IRF) in the Hours and Incident Tracking System (HITS) database. Drills must be documented and critiqued for effectiveness listing any deficiencies for follow-up or corrective action. When appropriate, Lessons Learned will be developed by the ERC with the assistance of the RHSM and FOM for offices or PM for projects.

8.0 Attachments

Attachment 1: [Types of Emergencies](#)

Attachment 2: [Emergency Contacts Form](#)

9.0 Revision Log

Revision	Date	Description	Written by	Approved by
1	05/18/2007	Updated to Standard Operating Procedure	Jeff Stumpf	<i>R. Keith Christopher</i>
2	11/04/2008	Added clarification in Section 5.1 Emergency Plans, to ensure adequate planning and training for employees who may provide defensive actions. Clarified in section 5.1, that employees are not required to operate critical operations as part of the emergency action plan. Clarified in section 5.1.2, Field Project Sites to determine whether defensive actions can be safely performed by employees when an incipient fire, chemical spill or release occurs.	Jeff Stumpf	<i>R. Keith Christopher</i>
3	12/17/2008	Clarification in Section 6.0 for employee training requirements of ERP	Jeff Stumpf	<i>R. Keith Christopher</i>
4	06/23/2009	Updated Medical Consultant contact in Emergency Contact Form.	Jeff Stumpf	<i>R. Keith Christopher</i>



Emergency Response Plan Standard Operating Procedure HSE-106

Attachment 1—Types of Emergencies

The types of emergencies that require planning will vary from project to project and from office to office. The following is a list of emergencies and general guidelines to consider in developing the office or field project ERP. The objective is to develop an ERP and procedures for the range of situations that may require management and coordination of multiple response resources, timely actions to protect potentially affected employees, and/or communication with external organizations. Such situations may include one or more of the following:

Medical Emergencies (Fatalities; life-threatening, serious, and minor injuries and illnesses; motor vehicle accidents; and chemical exposures)

Only do the following if safe to do so and will not harm the person responding.

- Immediately notify appropriate response personnel (internal and external emergency medical providers)
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- The ERC shall assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Make certain that the injured person is accompanied to the emergency room.
- Perform decontamination where feasible; lifesaving and emergency medical treatment take priority.
- Implement HSE-111 (Incident Notification, Reporting, and Investigation), which specifies internal notification requirements and completion of the Incident Report Form (IRF)
- Notify and submit reports to client as required in contract.

Process Emergencies (Fires, explosions, chemical releases, and chemical spills)

- Immediately notify appropriate response personnel (internal and external)
- Shut down CH2M HILL operations and evacuate the immediate work area. (Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled).
- Assess the need for building or site evacuation, and evacuate as warranted.
- Account for personnel at the designated assembly area(s).
- Implement HSE-111 (Incident Notification, Reporting, and Investigation), which specifies internal notification requirements and completion of the Incident Report Form (IRF)

- Notify and submit reports to client as required in contract.

Natural Emergencies (Earthquake, tornado, hurricane, flash flooding, and other serious inclement weather)

The ERP shall include specific emergency procedures regarding natural emergencies for offices and field projects that are located in areas susceptible to such events. The procedures should include notification of appropriate response personnel, shelter and assembly areas, and provisions for providing disaster relief supplies (such as food and water).

Other Emergencies (Bomb threats, workplace violence, and civil disorder)

The ERP shall include specific emergency procedures regarding “other emergencies” for offices and field projects that are located in areas susceptible to such events. The procedures should include notification of appropriate response personnel and shelter and assembly areas.

Emergency Contacts

Serious Incident Reporting:
720-286-4911

Medical Emergency

Facility Medical Response #:

Local Ambulance #:

**Injury Management/Return-to-Work
(IMRTW - For US and Puerto Rico employees only)**

1-866-893-2514

CH2M HILL IMRTW Medical Consultant

WorkCare

Peter P. Greaney, MD

300 S. Harbor Boulevard, Suite 600

Anaheim, CA 92805

1-714-456-2114

1-800--455-6155

(After hours call 1-866-893-2514 for response by oncall physician)

Fire/Spill Emergency Facility Fire Response #:

Local Occupational Physician

Local Fire Dept #:

Security & Police Facility Security #:

Local Police #:

Responsible Health and Safety Manager (RHSM)

Name:

Phone:

Utilities Emergency

Water:

Gas:

Electric:

Responsible Environmental Manager (REM)

Name:

Phone:

Emergency Response Coordinator (ERC)

Name:

Phone:

Human Resources Representative

Name:

Phone:

Project Manager

Name:

Phone:

Media Inquiries Corporate Strategic Communications

Name: John Corsi

Phone: 720.286.2087

Federal Express Dangerous Goods Shipping

Phone: 800/238-5355

**CH2M HILL Emergency Number for Shipping
Dangerous Goods**

Phone: 800/255-3924

Worker's Compensation:

Complete IRF to initiate process. For immediate assistance contact Regional HR Dept. or for an after hours emergency contact Jennifer Rindahl: 303/918/8130

Automobile Accidents:

Rental: Linda Anderson/COR 720/286-2401

CH2M HILL owned or fleet vehicle: Linda George/DEN 720-286-2057

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms:

Evacuation Assembly Area(s):

Facility/Site Evacuation Route(s):

Hospital Name/Address:

Hospital Phone #:

Directions to Hospital

Include written directions here, and attach or post a highlighted map if needed.



[Click here for attachments](#)

Hazard Communication

Enterprise Standard Operating Procedure HSE-107

1.0 Purpose

This Enterprise Health Safety and Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities, Business Groups (BGs), and International Regions must comply with to provide information to employees about the hazardous chemicals that they work with or around.

1.1 References

The following regulations were referenced to prepare this Enterprise SOP:

- Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Fourth Revised Edition, United Nations, 2011
- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1200 (General Industry) and 1926.59 (Construction), Hazard Communication 2012 (HCS 2012), as promulgated on March 26, 2012 (77 Federal Register 17574-17896)
- Health Canada, Hazardous Products Act (HPA), Controlled Product Regulations – Workplace Hazardous Material Information System (WHMIS)
- Australia, National Code of Practice for the Control of Workplace Hazardous Substances [NOHSC:2007(1994)], Model Code of Practice – Managing Risks of Hazardous Chemicals in the Work Place (2012), and National model Work Health and Safety (WHS) Regulations (2012)

2.0 Scope and Application

2.1 Scope

This SOP serves as the Hazard Communication written plan. It describes the requirements for implementing the process for informing employees on the hazardous materials they work with or around by means of a hazard communication program that includes container labels and other forms of warning, safety data sheets (SDSs), and information and training.

2.2 Application

This SOP applies Enterprise-wide to all CH2M HILL Legal entities, BGs, and International Regions, to subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally, where employees could come into contact hazardous materials.

This Enterprise SOP applies when:

- CH2M HILL employees are exposed to hazardous materials in offices, warehouses, laboratories, field projects, and any other location where chemical hazards potentially exist. This includes CH2M HILL full-time, part-time, and flex employees and contingent worker (contract or temporary agency) hired and supervised by CH2M HILL.
- CH2M HILL subcontractors, when CH2M HILL is responsible for project safety.

Where State OSHA agencies have more stringent requirements, contact the appropriate BG Responsible Health and Safety Manager (RHSM) to address those specific requirements.

For international operations, this SOP should be followed as a minimum requirement, but country-specific HSE regulations (e.g., Canada, Australia, or European Union countries) shall prevail, and an applicable SOP should be developed to comply with specific HSE regulations.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standards of Practice or SOPs that are applicable to this Hazard Communication SOP include the following:

- [HSE-110, Training](#)
- [HSE-119, Recordkeeping and Access to Records](#)
- [HSE-207, Exposure Assessment](#)

3.0 Definitions

3.1 Articles

Articles are manufactured items that are formed to specific shape or design during production, have end-use function(s) that depend in whole or in part upon their shape or design, and undergo no change in chemical composition and physical state during the end use. Fluids and particles are not considered articles, regardless of the shape or design.

3.2 Consumer Products

Consumer products are any product that can be purchased in a retail store and is available to the general public for personal or household use. Consumer products are exempt from hazard communication unless the product is used in a manner inconsistent with its intended use or in excessive quantities that create a physical or health hazard. In Australia, if a consumer product is used in the work setting, then it is included and must meet the requirements of this SOP.

3.3 Container

Container means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or similar configuration that holds a hazardous chemical. For purposes of this SOP, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

3.4 Globally Harmonized System (GHS) of Hazard Communication

Globally Harmonized System (GHS) is an internationally agreed-upon system for the classification and labeling of chemicals, created by the United Nations, designed to replace the various classification and labeling standards used in different countries by using consistent criteria for classification and labeling on a global level.

3.5 Hazardous Chemicals

Hazardous chemical means any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

- Physical hazard means a chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.
- Health hazard means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.
- Hazards not otherwise classified (HNOC) means an adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes adopted by the OSHA HCS 2012, but the effect either falls below the cut-off value/concentration limit of the hazard class or is under a GHS hazard category.

3.6 Label

Label means the written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the container of a hazardous chemical, or to the outside packaging.

3.7 Regulated Products

Regulated products include *consumer products* used in a manner inconsistent with the intended use or in excessive quantities that create a physical or health hazard (refer to qualifier under consumer product definition) and all *hazardous chemicals*. Products that are specifically exempt from hazard communication include hazardous waste; tobacco products; wood products; and food, drugs, and cosmetics intended for personal consumption or use. Hazardous waste is not exempt from the requirements of this SOP in Australia.

3.8 Safety Data Sheet

A *Safety data sheet (SDS)*, formerly known as the Material Safety Data Sheet (MSDS), is a written or printed material concerning a hazardous chemical that is prepared in accordance with GHS criteria, consisting of 16 sections that appear in the same order, and containing uniform information regarding the hazardous chemical.

4.0 Roles and Responsibilities

Listed below are the roles and responsibilities required to implement the company Hazard Communication program.

4.1 CH2M HILL Employees

All CH2M HILL employees and contingent workers must complete initial hazard communication training and chemical specific training as required, follow prescribed safe work practices when working with regulated products, and report any program inconsistencies to their supervisor, PM, or HCC.

4.2 Facility Operations Lead (FOL)

The FOL will assure a hazard communication program has been implemented and assigned an HCC for their office, warehouse, or laboratory within their area of responsibility.

4.3 Project Manager (PM)

The PM will assure that a hazard communication program has been implemented at each field project under their direction and assign a Hazard Communication Coordinator (HCC) for each project.

4.4 Regional Managing Director (RMD)

The RMD will assure a hazard communication program has been implemented and assigned an HCC for each office, warehouse, or laboratory within their International Region.

4.4 Responsible Health and Safety Manager (RHSM)

The RHSM for the BG will verify that the hazard communication program has been implemented in each project within their assigned projects, and the Region RHSM will verify this implementation for each office, warehouse, or laboratory within their area of responsibility. The RHSM, either for the Region or BG, will assist with assigning an HCC at each location or project, serve as the technical resource to the HCC, provide label information for non-labeled containers, and assist with developing and delivering chemical-specific training.

4.6 Hazard Communication Coordinator (HCC)

The office or project Safety Coordinator (SC) typically is assigned by the RMD or the PM respectively as the HCC to implement the hazard communication program at their location. Duties include completing and maintaining a chemical inventory, assuring containers are properly labeled, maintaining the SDS file, assuring unauthorized chemicals are not being stored or used in the office or project, and identifying who may require additional training and assisting with or providing the necessary chemical-specific training.

4.7 Safety Program Assistant (SPA)

The SPA schedules hazard communication training as part of new employee orientation and maintains training records for their BG or Region.

4.8 Warehouse Coordinator

The Warehouse Coordinator is assigned as the HCC for warehouse locations when these locations are separate from the office.

5.0 Requirements

The following requirements described in this Enterprise SOP must be implemented. Each office, warehouse, laboratory, and field project must have an assigned HCC. The HCC toolkit in Attachment 1 has been developed to assist the HCC with their responsibilities.

5.1 Chemical Inventory and Register

The HCC for each facility or project shall compile and keep current a chemical inventory list or register of the *regulated products* known to be present in the workplace. The HCC shall use the Chemical Inventory Form in Appendix A of Attachment 1 (or equivalent) to complete and retain the inventory form for a facility or project hazard communication file. Inventories must be updated as new *regulated products* are brought on site or at least every 6 months.

Subcontractors shall maintain their inventory list or register on site the *regulated products* used or brought on site. The subcontractor will also send a copy to the CH2M HILL HCC.

5.3 Material Safety Data Sheet (MSDS) or Safety Data Sheets (SDS)

The HCC shall verify that an MSDS or SDS is available for each *regulated product* listed on the chemical inventory or register, and noted on the Chemical Inventory Form. The OSHA form 174, Material Safety Data Sheet (MSDS) is being replaced by the Globally Harmonized System (GHS) SDS format. Description of the 16 SDS sections is listed in Attachment 2, Globally Harmonized Safety Label and Safety Data Sheet Summary. Previous versions of the regulated product MSDS or SDS must be replaced with the current version and retained consistent with the requirements described in HSE-119, *Recordkeeping and Access to Records*. The SDSs will be maintained in a facility or project hazard communication file or in a data sheet binder for each office, warehouse, laboratory, and field project and must be kept in a place for all employees to access any time someone is on site. CH2M HILL field project employees and subcontractors will also be informed of the location of MSDS or SDS from the client, contractors, and subcontractors for *regulated products* to which they are exposed.

5.4 Container Labeling

Manufacturers of regulated products are required to provide labeling on their original containers. In the United States, OSHA requires that the GHS label be used by manufacturers beginning June 1, 2015, and by chemical distributors by December 1, 2015. In Australia, the GHS label must be used after December 31, 2016. The six required elements of the GHS label must include the product identifier, pictograms, signal word, hazard statements, precautionary statements, and the name, address, and telephone number of the chemical manufacturer, importer or other responsible party. Refer to Attachment 3, Globally Harmonized System Label and Safety Data Sheet Summary.

The manufacturer's original label on any incoming regulated product must not be removed or defaced. The manufacturer's label and markings must be retained on the package or

container until it is sufficiently cleaned of residue and purged of vapors to remove any potential hazards.

Regulated products transferred from the manufacturer's original container to a workplace or secondary container must be labeled with the appropriate product identification, hazardous warning and precautionary use information. Labeling systems such as the Five-Level Bar Chart styles - The HazCom Identification System (THIS®) and Hazardous Materials Information Guide (HMIG®), the HCL®, and the National Fire Protection Agency 704 (NFPA) are acceptable, unless country-specific systems, such as required by Canada for Workplace Hazard Materials Identification System (WHMIS), must be used. The HCC, with the assistance from the RHSM, will be responsible for determining the correct information for each regulated product label when not contained in manufacturer's original container.

During the chemical inventory, the HCC shall verify that each container holding regulated products is provided with a legible label that has the required information and that it is noted on the Chemical Inventory Form. The HCC can contact the RHSM if there is question concerning existing labels or the need for additional labeling requirements.

Refer to Attachment 3: Example Workplace Container Labeling Systems, and Attachment: Examples of Workplace Container Labels for Benzene.

Note: The numerical hazard rating scale for the NFPA 704 label and the Five-Level Bar Chart style labels have not changed and currently are allowed to be used in the US until June 1, 2016. As a point of reference only, the GHS uses a numerical scale to classify health and physical hazards from 1 being the greatest hazard to 5 being the least hazard to determine the labeling requirements only. This rating scale is not on the GHS label.

5.5 Subcontractor Management

The HCC shall verify that each subcontractor is maintaining an up-to-date inventory list or register of *regulated products* and corresponding MSDSs or SDSs and is labeling their regulated product containers. Subcontractors shall implement their own hazard communication program that meets regulatory and project requirements.

6.0 Hazard Communication Training

Employees must be informed and instructed of the requirements of the hazard communication SOP as well as the location of the written hazard communication program, *regulated product* inventories, and MSDS or SDSs.

6.1 Initial Training

All CH2M HILL employees shall complete initial hazard communication training. This training involves completing a computer-based New Employee HSE Orientation or the Hazard Communication training module on the HSE web site. Training from other companies cannot be used as a substitute for CH2M HILL initial training.

6.2 Globally Harmonized System (GHS) Training

CH2M HILL employees in the United States assigned a Worker Category (Refer to HSE-110, Training), other than General Office Worker (GOW), must complete the GHS training to meet the OSHA "2012" Hazard Communication Standard (HCS).

The options to complete the training are as follows:

- Access the CH2M HILL University online course on the HSE Training Course website.
- Attend a GHS classroom version on CD ROM at the project site if employees do not have a CH2M HILL personal computer or direct access to the online training program.
- Complete the 2013 OSHA 8-hour refresher course which includes the GHS training module presented as part of the course.

6.3 Chemical-Specific Training

Chemical-specific training shall be conducted when employees meet the following criteria:

- Assigned to a new area or project where *regulated products* are used for which they have not previously received training
- Work where new *regulated products* are introduced
- Work where existing *regulated products* are modified or reformulated to contain new physical or health hazards

The PM/FOL or supervisor is responsible for identifying employees who use or are exposed to *regulated products* and for notifying the HCC. The HCC will provide chemical-specific training on those products. The HCC shall use the Chemical-Specific Training Form in Appendix A of Attachment 1 to document this training.

6.4 Subcontractor Training

CH2M HILL will provide subcontractors with the chemical-specific information regarding the *regulated products* used by CH2M HILL that may affect the subcontractor's personnel. The subcontractor in the U.S. is responsible for conducting the GHS training consistent with OSHA "HCS 2012" and chemical-specific training for their employees. Subcontractors will provide the HCC with the *regulated product* chemical-specific information for the *regulated products* that they bring to the project site. CH2M HILL will then inform its employees who are working around the subcontractor's *regulated products* of the chemical-specific information.

7.0 Attachments

- | | |
|---------------|--|
| Attachment 1: | Hazard Communication Coordinator's Toolkit |
| Attachment 2: | Globally Harmonized System Label and Safety Data Sheet Summary |
| Attachment 3: | Example Workplace Container Labeling Systems |
| Attachment 4: | Examples of Workplace Container Labels for Benzene |

8.0 Revision Log

Revision	Date	Description	Prepared by	Approved by
1	03/19/2007	Updated to Standard Operating Procedure	Jeff Stumpf Sandy Wise	<i>R. Keith Christopher</i>
2	12/22/2008	Revised section 5.4, Container Labeling for clarification on labeling requirements.	Jeff Stumpf	<i>R. Keith Christopher</i>
3	06/05/2013	Updated to include Globally Harmonized System (GHS) requirements for labeling and safety data sheets for the hazard communication program. Added attachments for GHS label and safety data sheet references, example secondary container labels, and example labels for Benzene. Added SDS as a reference to the term MSDS. Retained the term MSDS in Attachment 1 since it is still applicable for WHMIS	Jeff Stumpf	<i>Angelo Liburd</i>

Hazard Communication - Standard of Practice HSE-107

Introduction

Your Regional Managing Director (RMD) or Project Manager (PM) has identified you as a Hazard Communication Coordinator (HCC) for your facility or project. Your Responsible Health and Safety Manager (RHSM), either regional or business group, is your technical resource for implementing a hazard communication program, and this toolkit was developed to inform and assist you in meeting the responsibilities of the HCC.

The HCC must be familiar with CH2M HILL's written hazard communication program, Standard Operating Procedure (SOP) HSE-107. If you have any questions regarding your responsibilities or believe that you do not have enough information to complete these responsibilities, contact your RMD, PM, or RHSM.

Responsibilities

1. Complete chemical inventory or register and verify product labeling

A chemical inventory or register of all *regulated products* in the workplace must be compiled and kept current. The HCC shall update the chemical inventory when new *regulated products* are introduced into the workplace or when there are changes to existing *regulated products*. Since each facility or project will differ in the amount of *regulated products* coming into the workplace, the HCC must use his or her own judgment on how often the chemical inventory must be updated. However, the chemical inventory must be reviewed for accuracy and completeness at least every 6 months. The HCC shall use the Chemical Inventory Form in Appendix A.

Project HCC's shall request a chemical inventory from the client, contractors, and subcontractors for all *regulated products* to which CH2M HILL employees and subcontractors are potentially exposed and retain the inventories in the facility/ project hazard communication file.

Process:

1. Inspect the facility or project for *regulated products*; including all storage areas (refer to Section 3.4 of SOP HSE-107 for definition of *regulated products*).
2. List the *regulated products* on the Chemical Inventory Form by the name provided on the product label.
3. Provide the location of the listed *regulated products*.
4. During the inventory, verify that each regulated product container is provided with a legible label that has the identity of the product, appropriate hazard warnings and name & address of the chemical manufacturer, importer or other responsible party. The manufacturer's original label on any incoming regulated product must not be removed or defaced. This shall be noted on the Chemical Inventory Form (contact the RHSM if a container requires additional labeling).

5. Regulated products not in the manufacturer's original container or secondary containers must also be labeled with the appropriate hazardous warning and information. Labeling systems such as the Hazard Materials Identification System (HMIS) or National Fire Protection Agency (NFPA) are acceptable, unless country-specific systems such as required by Canada for Workplace Hazard Materials Identification System (WHMIS) must be used.
6. Retain the Chemical Inventory Form in the facility or project hazard communication file.
7. Update the inventory as necessary, but every 6 months at a minimum.

2. Maintain material safety data sheets (MSDS) and safety data sheets (SDS)

Material Safety Data Sheets (MSDSs) and Safety Data Sheets (SDSs) must be made available for each *regulated product* listed on the chemical inventory. The MSDSs or SDSs must be maintained in the facility hazard communication file or an SDS binder and must be made accessible to all employees.

The HCC shall verify that a current MSDS or SDS from the appropriate manufacturer is available for each product listed on the chemical inventory and noted on the Chemical Inventory Form. Common practice is that the MSDS or SDS is sent with the shipment of hazardous materials. If an MSDS or SDS is not available for a specific product, the HCC can directly contact the manufacturer or distributor by telephone and have the MSDS or SDS sent to them, or the HCC must use the SDS Request Letter (Appendix B) to request an SDS from the product manufacturer. The SDS Request Letter is not mandatory for use in countries other than the United States. The HCC shall maintain a copy of completed SDS Request Letter until the SDS is received. The HCC shall follow up with the manufacturer if a prompt response to the letter does not occur.

The MSDSs or SDSs must be maintained in the facility or project hazard communication file or in a binder for each office, warehouse, laboratory, and field project and be made accessible to all employees. CH2M HILL field project employees and subcontractors must also be informed of the location of appropriate MSDS or SDS from the client, contractors, and subcontractors for *regulated products* to which they are exposed.

In the United States, the MSDS or SDS shall be in English, although copies in other languages may be kept as well. The Globally Harmonized System SDS contains 16 required and standardized sections appearing in the same order as follows (Refer to Attachment 2, Globally Harmonized System Labeling and Safety Data Sheet Summary):

1. Identification of the substance or mixture and of the supplier
2. Hazards identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection.

9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. *Ecological information (non-mandatory)*
13. *Disposal considerations (non-mandatory)*
14. *Transport information (non-mandatory)*
15. *Regulatory information (non-mandatory)*
16. Other information, including date of preparation or last revision

In the United States, the MSDS shall be in English, although copies in other languages may be kept as well. In Canada, the MSDS must be in English and French. Currently, the MSDS should contain at least the following information:

- Identity used on the label
- Physical and chemical characteristics, such as vapor pressure, flash point
- Physical hazards, including the potential for fire, explosion, and reactivity
- Health hazards, including signs and symptoms of exposure and any medical conditions that are generally recognized as being aggravated by exposure to the chemical
- Primary route(s) of entry (e.g., inhalation, ingestion, absorption, injection)
- Regulatory Exposure Limits, such as OSHA-permissible exposure limit, American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value, and any other exposure limit used or recommended by the chemical manufacturer or employer preparing the MSDSs, where available
- Whether the hazardous chemical is listed as a carcinogen or potential carcinogen
- Precautions for safe handling and use, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for cleanup of spills and leaks
- Control measures, such as appropriate engineering controls, work practices, or personal protective equipment (PPE)
- Emergency and first aid procedures
- Date of preparation or the last change to the SDS
- Name, address, and telephone number of the chemical manufacturer or other responsible party preparing or distributing the SDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary

Process:

1. Verify that a MSDS or SDS is available for each product listed on the chemical inventory; this shall be noted on the Chemical Inventory Form.

2. Request missing SDSs from the product manufacturers by contacting the manufacturer or distributor by telephone to request to have the SDS sent to your office or by using the SDS Request Letter (Appendix B) to request the SDS from the product manufacturer and follow up with manufacturer until SDS is received.
3. Compile SDS in a facility or project hazard communication file or an SDS binder.
4. Project HCC shall also inform employees and subcontractors of the location of appropriate client, contractors, and subcontractors MSDS or SDS.

3. Provide chemical-specific training

CH2M HILL employees assigned with tasks that may cause exposure to *regulated products* shall be provided with chemical-specific training. This training shall occur prior to exposure and when performing a non-routine task (confined space entry) involving *regulated products*.

The HCC is responsible for identifying employees who use or are exposed to *regulated products* and providing chemical-specific training on those products. The HCC shall use the Chemical-Specific Training Form in Appendix C to provide this training.

The product's SDS shall be obtained and used to provide the following training information about each *regulated product*:

- Physical and health hazards
- Control measures that can be used to provide protection, including appropriate work practices, emergency procedures, and PPE to be used
- Methods and observations used to detect the presence or release of the regulated product in the work area (such as monitoring conducted by the employer, continuous monitoring devices, and visual appearance or odor of hazardous chemicals when being released)

When CH2M HILL is responsible for field project safety, affected subcontractors shall also be provided with this training. Project clients may provide this training for products they own or use. Client training shall be documented on the Chemical-Specific Training Form.

Employees are not expected to be trained on all the *regulated products* listed on the chemical inventory, just the products they use or to which they are exposed. The following are examples of personnel and tasks that would require chemical-specific training.

Office Employees

A graphic artist who uses *hazardous chemicals* would require chemical-specific training on the chemicals used in the graphics department. Chemical-specific training would not be required for other staff working in the same office or walking through the graphics department unless "exposure" is expected. However, staff should be made aware that *hazardous chemicals* are used in this area.

Occasionally using a consumer cleaner (e.g., germicidal spray) to clean your telephone would not require chemical-specific training. A janitor who uses cleaning supplies each day, all day would require chemical-specific training, even if the supplies were consumer products. The quantities used and duration of use would not be considered normal consumer use in this case.

Warehouse Employees

A warehouse employee who is responsible for cleaning leaks or spills from *hazardous chemical* containers would require chemical-specific training because this activity may result in chemical exposure and specific precautions are required. The chemical-specific training presented in this case would not be expected to cover each *hazardous chemical* stored in the warehouse; instead, the training should cover the general hazards of chemicals stored, an understanding of the labeling systems used, the protective measures to be taken during clean-up, and the signs and symptoms of exposure. Other warehouse employees who are instructed to immediately leave the area in the event of a leak or spill would not be required to receive chemical-specific training but should be instructed on how leaks are detected and emergency procedures.

Laboratory Employees

CH2M HILL laboratories are required to have a chemical hygiene plan, and all laboratory employees are required to complete laboratory safety training that meets the hazard communication training requirements. Laboratory employees are not necessarily required to complete chemical-specific training, however, they are required to take CH2M HILL's initial hazard communication training.

Project Employees

A field engineer must internally inspect a tank that once contained a *hazardous chemical*. This activity would require chemical-specific training since it would be considered a non-routine task and could represent chemical exposure.

Project employees working next to an open-process system containing a *hazardous chemical* or other *regulated products* would require chemical-specific training because this activity could result in chemical exposure. Client training may be substituted for CH2M HILL chemical-specific training if the client training covers all the training elements listed above.

If a contractor is applying a hazardous chemical in close proximity to a CH2M HILL operation and if it is determined that the activity may potentially expose CH2M HILL personnel, chemical-specific training would be required.

Process:

1. Identify employees who use or are exposed to *regulated products*.
2. Obtain the MSDS or SDS for each product to be covered.
3. Review the MSDSs or SDSs with affected employees and complete Chemical-Specific Training Form (contact RHSM for training assistance).
4. Retain form in facility or project hazard communication file.

4. Create a facility or project hazard communication file

A facility or project hazard communication file must be created for each office, warehouse, laboratory, and field project and shall include the following items:

1. Copy of CH2M HILL's written hazard communication program (SOP HSE-107)
2. Copy of the most current Chemical Inventory Form
3. Copies of Chemical-Specific Training Forms

The MSDS or SDS must be kept in the facility or project hazard communication file or in a separate binder. A copy of the SDS Request Letter for *regulated products* that has been sent to the manufacturer must also be contained in the file. The MSDSs or SDSs must be made accessible to all employees and their location known.

Appendixes

Appendix A Chemical Inventory Form

Appendix B SDS Request Letter

Appendix C Chemical-Specific Training Form



Hazard Communication

Standard Operating Procedure HSE-107

Attachment 1: Hazard Communication Coordinator's Toolkit

Appendix A: Chemical Inventory Form

CHEMICAL INVENTORY/REGISTER FORM

Refer to Standard of Practice HSE-107 Attachment 1 for instructions on completing this form.

Location: _____			
HCC: _____			
<input type="checkbox"/> Office	<input type="checkbox"/> Warehouse	<input type="checkbox"/> Laboratory	<input type="checkbox"/> Project: _____
			Project No.: _____

Regulated Product	Location	Container labeled (✓if yes)	SDS available (✓if yes)

SDS for the listed products will be maintained at: _____
--



Hazard Communication

Standard Operating Procedure HSE-107

Attachment 1: Hazard Communication Coordinator's Toolkit

Appendix B: SDS Request Letter

SAFETY DATA SHEET REQUEST LETTER

CH2MHILL
FACILITY ADDRESS

DATE

MANUFACTURER/OWNER OF
PRODUCT ADDRESS

To Whom It May Concern:

The (insert applicable regulation reference, such as Federal Hazard Communication Standard 29 CFR 1910.1200, Workplace Hazardous Materials Information System) requires that safety data sheets be made available to our employees upon request.

In order that we may fulfill this obligation, we request that you supply us with the most current version of the material safety data sheet(s) or safety data sheet(s) for the product(s) listed below.

<List product names>

If, in your opinion, a product does not require a MSDS or SDS, as referenced above, please advise us in writing.

Thank you for your assistance in this matter. We would appreciate receiving any future updates of these safety data sheets.

Sincerely,

NAME



Hazard Communication

Standard Operating Procedure HSE-107

Attachment 1: Hazard Communication Coordinator's Toolkit

Appendix C: Chemical-Specific Training Form



CHEMICAL-SPECIFIC TRAINING FORM

Refer to Standard Operating Procedure HSE-107 Attachment 1 for instructions on completing this form.

Location: _____ Project No. (if appropriate): _____
HCC: _____ Trainer: _____

TRAINING PARTICIPANTS:

Name	Signature	Name	Signature

REGULATED PRODUCTS AND/OR TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS or SDS to provide the following information concerning each of the products listed above:

- ☐ Physical and health hazards
- ☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- ☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, and visual appearance or odor of regulated product when being released)

Training participants shall have the opportunity to ask questions concerning these products and upon completion of this training will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs or SDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.



Hazard Communication






Standard Operating Procedure HSE-107

Attachment 2: Globally Harmonized System Label and Safety Data Sheet Summary

GHS Label Elements and Safety Data Sheet Sections

Main Hazard Groups: Physical - Health - Environmental



PHYSICAL HAZARDS: Explosives, reactive and flammables that harm.

 <p>CORROSIVE Skin Corrosion/Burns Eye damage Corrosive to Metals</p>	 <p>GAS CYLINDER Gas Under Pressure</p>
 <p>EXPLODING Explosives Self-Reactives Organic Peroxides</p>	 <p>FLAME OVER CIRCLE Oxidizers</p>
 <p>FLAME Flammables, Pyrophorics, Self Heating Emits Flammable Gas, Self Reactives Organic Peroxides</p>	

HEALTH HAZARDS: Effects range from skin irritations to life threatening

 <p>HEALTH HAZARD Carcinogen, Mutagenicity, Reproductive Toxicity Respiratory Sensitizer, Target Organ Toxicity, Aspiration Toxicity</p>
 <p>SKULL AND CROSSBONES Acute Toxicity (Fatal or Toxic)</p>
 <p>CORROSIVE Skin Corrosion/Burns Eye damage Corrosive to Metals</p>
 <p>EXCLAMATION MARK Irritant (skin and eye), Skin Sensitizer, Acute Toxicity Narcosis Effects, Respiratory Track Irritant Hazardous to the ozone layer</p>


ENVIRONMENTAL HAZARDS: Harmful to water life or the ozone layer

 <p>EXCLAMATION MARK Irritant (skin and eye), Skin Sensitizer, Acute Toxicity Narcosis Effects, Respiratory Track Irritant Hazardous to the ozone layer</p>
 <p>ENVIRONMENT - Non Mandatory Aquatic Toxicity</p>



Safety Data Sheet - Description of the 16 Sections




- 1: Identification**
Includes product identifier, manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions of use.
- 2: Hazard(s) Identification:**
Includes all hazards regarding the chemical; required label requirements
- 3: Composition/Information of Ingredients**
Includes information on chemical ingredients; trade secret claims
- 4: First-Aid Measures**
Includes important symptoms/effects, acute, delayed; required treatment
- 5: Fire-Fighting Measures**
Lists suitable extinguishing techniques, equipment; chemical hazards from fire
- 6: Accidental Release Measures**
Lists emergency procedures; protective equipment; proper methods of containment and cleanup
- 7: Handling and Storage**
Lists precautions for safe handling and storage, including incompatibilities
- 8: Exposure Controls/Personal Protections**
Lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; Personal Protective Equipment (PPE)
- 9: Physical and Chemical Properties**
Lists the chemicals characteristics
- 10: Stability and Reactivity**
Lists chemical stability and possibility of hazardous reactions
- 11: Toxicological Information**
Includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity
- 12: Ecological Information**
- 13: Disposal Information**
- 14: Transport Information**
- 15: Regulatory Information**
- 16: Other Information**
Includes the date of preparation or last revision

Chemical Name/Code		Should match the Safety Data Sheet
DANGER		Product Identifier
	Highly Flammable liquid and vapor. May cause Liver and Kidney damage.	
Signal Word/Hazard Statement		Precautionary Statements
<p>Keep container tightly closed. Store in cool, well ventilated place that is locked. Keep away from heat/spark/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measure against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear Protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.</p>		
<p>In case of Fire: Highly Flammable in presence of open flames or spark. Small Fire: Use DRY chemical. Large Fire: Use alcohol Foam, water spray or fog. First Aid: Keep victim calm, obtain medical treatment immediately. Move to fresh air. If rapid recovery does not occur - transport to medical facility. If on skin/hair - take off immediately contaminated clothing, flush with warm water for 15 minutes.</p>		
Directions for Use:		Supplemental Information
Fill Weight:	Lot Number:	
Expiration Date:	Fill Date:	
Company Name:		Address:
City:	ST:	Zip:
		24 Hour Phone:
Supplier Information		

Attachment 3: Example Workplace Container Labeling Systems

Example Secondary Container Labels

Difference between GHS Hazard Categories and NFPA/Five Bar Hazard Ratings.

 GHS	Category	Category	Category	Category	Category
	5	4	3	2	1
<p><i>LESS Hazardous</i>  <i>MORE Hazardous</i></p>					
 NFPA Five-Level Bar	Minimal	Slight	Moderate	Serious	Severe
	0	1	2	3	4

NFPA



HCL



1 ACETONE

(CAS# 64-19-7)

3 DANGER!

Acute: MAY CAUSE IRRITATION OF EYES, SKIN, NOSE, THROAT. EXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE DIZZINESS, HEADACHES.

Chronic: REPEATED OR PROLONGED EXPOSURE MAY CAUSE SKIN DRYING AND CRACKING, BRAIN OR NERVE DAMAGE.

5 **Do not breathe vapor or mist.** Do not get it in eyes, on skin, on clothing. Keep container closed and sealed from heat, sparks, flame. Use only with adequate ventilation. Wash thoroughly after handling.

2 FLAMMABLE

FIRST AID:

IF CONTACTED: Immediately flush with plenty of water for at least 15 minutes, holding eyelids open. Wash eyes with soap and water. GET MEDICAL ATTENTION for eyes. Wash contaminated clothing before reuse.

IF INHALED: Remove to fresh air. If not breathing, give artificial respiration. If cough or breathing difficulty develops, GET MEDICAL ATTENTION.

IF SWALLOWED: Give water or milk to drink. DO NOT INDUCE VOMITING. CONSULT POISON CONTROL, HOTLINE AT 1-800-222-1222. Never give anything by mouth to an unconscious or convulsive person.

Refer to MSDS for additional information.

HCL# 8004241670

WWW.HCLCO.COM









































SCL 00019-VM-0023-0006

- | | | | |
|---|--|---|-----------------------|
| 1 | Chemical Name | 5 | Precautions |
| 2 | Composition or
Synonyms & CAS# | 6 | First Aid Information |
| 3 | Hazard or Caution
Phrases | | |
| 4 | Signal or Warning Words
(Hazard Severity) | | |



Five-Bar Level Label



HMIG Five Bar with PPE Chart

CHEMICAL NAME	PROTECTIVE EQUIPMENT GUIDE	
HEALTH	A 	G   
FLAMMABILITY	B  	H   
REACTIVITY	C   	I   
PROTECTIVE EQUIPMENT	D    	J    
	E    	K    
	F         	X <i>Ask your supervisor for special handling instructions.</i>

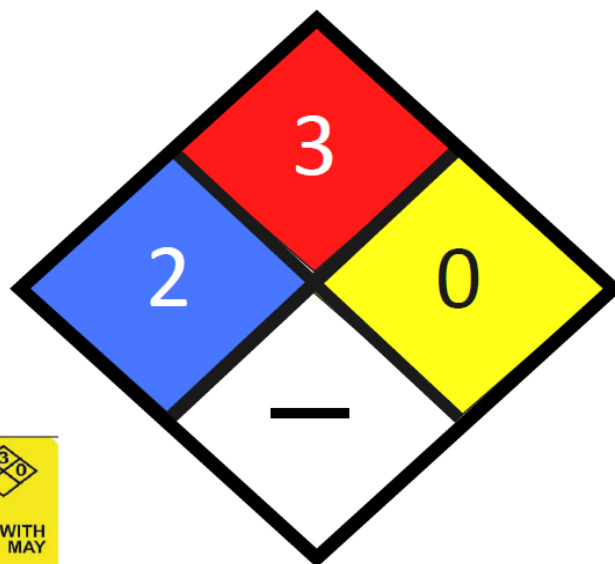
THIS Target Organ Label with PPE Chart

(CHECK OFF APPROPRIATE BOXES)		Chemical Identity 	
ROUTE OF EXPOSURE			
<input type="checkbox"/> INHALATION	<input type="checkbox"/> EYE/INJECTION	<input type="checkbox"/> SKIN OR EYE CONTACT	
REAL-TIME ANALYSIS			
<input type="checkbox"/> MEASUREMENT IN AIR/ZONE	<input type="checkbox"/> TOXIC	<input type="checkbox"/> CORROSIVE	<input type="checkbox"/> PYROLYTIC
<input type="checkbox"/> MOIST/TOXIC	<input type="checkbox"/> SENSITIZER	<input type="checkbox"/> CARCINOGEN	
PHYSICAL HAZARDS			
<input type="checkbox"/> HIGH PRESSURE	<input type="checkbox"/> EXPLOSIVE	<input type="checkbox"/> PYROLYTIC	2. Material Name 3. Hazardous Properties 4. Amount and Use of the 5. Service History 6. Service History 7. Service History
<input type="checkbox"/> COMPRESSED/LEAKAGE	<input type="checkbox"/> ALKALINE	<input type="checkbox"/> CORROSIVE	
<input type="checkbox"/> FLAMMABLE GASES	<input type="checkbox"/> ORGANIC PEROXIDE	<input type="checkbox"/> CORROSIVE	
<input type="checkbox"/> FLAMMABLE LIQUIDS/SOLIDS	<input type="checkbox"/> CORROSIVE		
<input type="checkbox"/> UNSTABLE (DEACTIVE)	<input type="checkbox"/> CORROSIVE		
TARGET ORGANS AND EFFECTS			
<input type="checkbox"/> LUNGS	<input type="checkbox"/> CENTRAL NERVOUS SYSTEM		Personal Protection 
<input type="checkbox"/> HEART	<input type="checkbox"/> GASTROINTESTINAL SYSTEM		
<input type="checkbox"/> SKIN/TEETH	<input type="checkbox"/> MUSCULOSKELETAL SYSTEM		
<input type="checkbox"/> EYES	<input type="checkbox"/> AUTONOMIC NERVOUS SYSTEM		
<input type="checkbox"/> NERVE	<input type="checkbox"/> REPRODUCTIVE SYSTEM		
<input type="checkbox"/> FROSTBITE	<input type="checkbox"/> MULTIPLE		
<input type="checkbox"/> BLOOD	<input type="checkbox"/> THERMAL		
<input type="checkbox"/> OTHER	<input type="checkbox"/> OTHER		

PERSONAL PROTECTION INDEX													
A					G								
B					H								
C					I								
D					J								
E					K								
F					X	Consult your supervisor or S.O.P. for "SPECIAL" handling directions							
A		n		o		p		q		r		s	
Safety Glasses		Splash Goggles		Face Shield & Eye Protection		Gloves		Boots		Synthetic Apron		Full Suit	
t		u		w		x		y		z		Additional Information	
Dust Respirator		Vapor Respirator		Dust & Vapor Respirator		Full Face Respirator		Airline Hose					

Attachment 4: Examples of Workplace Container Labels for Benzene

EXAMPLE: Benzene Labels



BENZENE
(CAS 71-43-2)

DANGER! **POISON** **FLAMMABLE**

CANCER HAZARD

Acute: MAY CAUSE IRRITATION OF EYES, SKIN, NOSE, THROAT, WITH SWELLING AND BLISTERING. INHALATION OR INGESTION MAY CAUSE DIZZINESS, HEADACHE, VOMITING, COMA AND DEATH.

Chronic: REPEATED OR PROLONGED EXPOSURE MAY CAUSE SKIN DRYING AND SCALING, FATIGUE, HEADACHE, WEIGHT LOSS, BLOOD CHANGES INCLUDING ANEMIA AND LEUKEMIA.

Do not breathe vapor or mist. Do not get in eyes, on skin, on clothing. Keep container closed and away from heat, sparks, flame. Use only with adequate ventilation. Wash thoroughly after handling.

FIRST AID:
IF CONTACTED: Immediately flush eyes or skin with plenty of water for at least 15 minutes while holding eyelids open. Wash skin with soap and water. GET MEDICAL ATTENTION. Wash contaminated clothing before reuse.
IF INHALED: Remove to fresh air. If not breathing, give artificial respiration. GET MEDICAL ATTENTION.
IF SWALLOWED: Give water to dilute. IMMEDIATELY CONSULT POISON CONTROL HOTLINE AT 1-800-222-1222. Never give anything by mouth to an unconscious or convulsive person.

Refer to MSDS for additional information.
 HCL 800/421-6710 WWW.HCLCO.COM 230-4-0606

BENZENE Benzol, Benzine, C₆H₆
 Catalogue Code: SLB1564, SLB3055, SLB2881

DANGER Highly flammable liquid and vapor. May be fatal if swallowed and enters airways. Causes skin and serious eye irritation. May cause genetic defects and cancer. Causes damage to organs through prolonged exposure. Suspected of damaging fertility or the unborn child.

Keep away from heat/sparks/open flames/hot surfaces. No smoking. Do not breathe vapors/spray. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use protective equipment as required; wear protective gloves/clothing/eye and face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosive proof electrical/ventilating and lighting equipment. Use only non sparking tools. Take precautionary measures against static discharge. Store locked up in a well ventilated place. Keep cool. Dispose of contents and container in accordance with local state and federal regulations.

First Aid: IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. **DO NOT** induce vomiting.
IF ON SKIN (or hair) - Remove /take off immediately all contaminated clothing, flush with warm water for 15 minutes.
IF IN EYES: Rinse cautiously with water for 15 minutes. Remove contact lenses - continue rinsing.
 If exposed or concerned: Get medical advise/attention.

In case of Fire: Highly Flammable in presence of open flames or spark
 Use dry sand, dry chemical or alcohol resistant foam for extinction

Directions for Use: Fill w/weight: Lot Number: Lot Number:
 Expiration Date: Fill Date:

Science Lab ScienceLab.com, Inc. 14025 Smith Road Houston, Texas, 77398
 Benzene@benzeneforyou.com 1-800-555-8765



[Click here for attachments](#)

Hearing Conservation Enterprise Standard Operating Procedure HSE-108

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups must comply with when implementing a hearing conservation program to provide employee protection from occupational hearing loss.

1.1 References

The following regulations were referenced to prepare this Enterprise Standard Operating Procedure:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.95, 29 CFR 1926.52, and 29 CFR 1926.101, Occupational Noise Exposure

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control employee exposure to occupational noise levels of 85 dBA and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. The elements of the CH2M HILL hearing conservation program include the following:

- Noise assessment of tasks that can produce noise levels in excess of 85 dBA or a maximum limit for impulsive noise of 140 dBc for a single impulse
- Identification and implementation of appropriate noise controls
- Training on hazards of noise and on control measures
- Audiometric testing and evaluation
- Record-keeping requirements

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL legal entities that operate in the United States (U.S.) and internationally when:

- CH2M HILL employees are exposed to noise levels exceeding 85 dBA posed by any work, regardless of the company responsible for the operation (CH2M HILL, subcontractor, or third party contractor),
- CH2M HILL provides oversight of a subcontractor's operation which generates noise levels in excess of the 85 dBA, and/or,
- CH2M HILL self-performs work tasks where exposure to noise levels exceeds 85 dBA.

Where state Occupational Safety and Health Administration (OSHA) agencies may have more stringent requirements, contact the appropriate responsible Business Group (BG) Health and Safety Manager to address these specific requirements.

For international operations, this SOP should be followed as a minimum requirement but country-specific H&S regulations (i.e., Australian or European Union countries) shall prevail, and an applicable SOP should be developed to comply with specific H&S regulations.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedures that are applicable to this Hearing Conservation SOP are as follows:

- [HSE-113, Medical Monitoring](#)
- [HSE-119, Recordkeeping and Access to Records](#)

3.0 Definitions

3.1 Noise Action Level (AL)

8-hour time-weighted average sound level of 85 decibels measured on the A-weighted scale (dBA), slow response or a dose of 50% of the allowable exposure level.

3.2 Impulsive or Impact Noise

A type of noise with a duration of less than one second. The level of impulsive or impact noise is measured on the C scale (dBc) using a "peak hold" or impact setting.

3.3 Noise Occupational Exposure Level (OEL)

8-hour time-weighted average sound level of 90 decibels measured on the A-weighted scale (dBA), slow response or a dose of 100% of allowable exposure level. The maximum limit for impulsive or impact noise is 140 dBc for a single event.

3.4 Noise Reduction Rating (NRR)

A Noise Reduction Rating (NRR) is the theoretically tested acoustical attenuation factor assigned to hearing protection devices. For CE (European) approved hearing protection the term Assumed Noise Protection Value (APV) is used.

3.5 Standard Threshold Shift (STS)

A change in hearing threshold relative to the baseline audiogram of an average of -10 dB or more at 2,000, 3,000, and 4,000 Hz in either ear adjusted for age. For Australia it is -15 dB or more at 3,000, 4,000 and 6,000 Hz in either ear.

3.6 Time Weighted Average (TWA)

Sound level averaged over a given period, as determined by monitoring at given times during the period or averaging data over the work shift. The time-weighted average may be calculated using Attachment 1.

4.0 Roles and Responsibilities

Listed are the roles and responsibilities required to implement the company's hearing conservation program.

4.1 Corporate Consulting Occupational Physician (CCOP)

The CCOP ensures network clinics comply with applicable regulations for audiometric testing equipment, including calibration and sound levels in surrounding areas in accordance with the Occupational Safety and Health Administration (OSHA) standards or local authority, evaluates audiometric test results to determine standard threshold shifts, notifies the employee and Medical Surveillance Program Administrator (MSPA) of standard threshold shifts, and maintains audiometric test results in employee medical files.

4.2 Project Manager (PM)

The PM will provide the responsible Health and Safety Manager (RHSM) and safety coordinator (SC) with project-specific information to determine what tasks or operations may require noise monitoring, and ensure the elements of the hearing conservation program are implemented, which can include determining that appropriate noise reduction controls are used, audiometric testing is completed, training is done, and appropriate hearing protection is acquired, worn, and maintained by project employees.

4.3 Responsible Health and Safety Manager (RHSM)

The RHSM determines project noise monitoring requirements, provides noise control recommendations and assistance, selects appropriate hearing protection, provides technical assistance to the SC for implementing the hearing conservation program, notifies employees who have experienced standard threshold shifts, and conducts project H&S audits on the effectiveness of the hearing conservation program.

4.4 Safety Coordinator (SC)

The SC, with the technical support of the RHSM, assesses the project site for noise exposure, maintains noise exposure records in the project files when required, notifies employees of noise monitoring results, verifies that hearing protection is provided and worn and that project employees have completed training and audiometric testing as required, and receives input from project staff that the assigned hearing protection meets ongoing requirements and effectiveness.

4.5 Safety Program Administrators (SPAs)

The SPA processes project requests for hearing protection and coordinates shipment with the RES, schedules and coordinates audiometric testing, and notifies the RHSM of employees with a standard threshold shift.

4.6 Regional Equipment Specialist (RES)

The RES maintains a standard inventory and variety of appropriate hearing protection, and ships hearing protection to projects and/or office locations as requested by the SPA, RHSM, or SC.

4.7 CH2M HILL Employees

All CH2M HILL employees who are exposed to noise levels in excess of 85 dBA, based on an eight-hour TWA are required to participate in the hearing conservation program that includes completing training, audiometric testing, and wearing hearing protection when required.

5.0 Requirements

The following requirements must be implemented when employees are exposed to levels in excess of 85 dBA. Employees must participate in the hearing conservation program when exposed to noise levels in excess of 85 dBA, based on an 8-hour TWA.

5.1 Noise Assessment

Based on information provided by the PM, project staff, and/or the client, the RHSM will conduct an assessment for potential noise exposure. The evaluation is comprised of qualitative and possibly quantitative exposure assessments. The RHSM will consider the following criteria as part of the qualitative assessment:

- Potential for employee exposure to noise (frequency and duration of “noisy” tasks)
- Availability of noise measurements recorded during similar tasks
- Client noise-monitoring data
- Applying their professional knowledge and experience

The qualitative noise exposure assessment will determine whether a quantitative noise assessment (noise monitoring) is required for any of the tasks or activities. The RHSM may elect not to conduct a qualitative exposure assessment on CH2M HILL projects that have infrequent or variable noise exposures or are of short duration. These types of exposures or projects may render noise monitoring ineffective for determining representative exposure; however, hearing protection will be provided for employees to wear.

Quantitative noise exposure assessments will be conducted as a result of the qualitative exposure assessment findings. The RHSM will determine the appropriate equipment, methods, and frequency for conducting the quantitative noise exposure assessments and provide the SC with technical assistance to perform the noise survey. Employees will be

provided an opportunity to observe noise monitoring and will be notified of the results at or above the AL by the RHSM.

5.2 Noise Control

If qualitative or quantitative noise assessments determine the potential for noise exposure to be at or above 85 dBA TWA, noise control measures must be implemented. The RHSM and SC will work with the PM and project staff to determine the appropriate and effective control measures. General considerations for noise control measures include the following:

- Engineering controls and safe work practices shall be considered first. When these methods cannot eliminate the hazard, administrative and/or hearing protection shall be used.
- The necessity for hearing protection is typically based on either hazards present in the work area or hazards created by the tasks to be performed.
- The RHSM shall specify and list the hazards and tasks that require hearing protection to be worn in the site-specific HSP or FSI. Verification that hearing protection is worn must be completed as part of the PPE hazard assessment by the SM, SC, or RHSM. This must be completed by designating the assigned hearing protection for each task in the HSP or FSI or an AHA with sign-off by the SM, SC, or RHSM.
- In work areas where actual or potential hazards are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner.

5.2.1 Engineering Controls

Where noise levels exceed the OEL, an engineering solution to reduce and maintain the noise level below 90 dBA TWA must be investigated and assessed. The assessment will identify all appropriate feasible solutions that should be considered for implementation. Engineering management controls may include:

- Selection, purchasing, and rental policy/specification requiring the purchase, lease, rental, and contracting of quiet equipment;
- Replacing defective equipment parts, such as bearings, blades, etc., on any CH2M HILL-owned or -operated equipment;
- Tightening loose or vibrating equipment, parts, etc., on any CH2M HILL-owned or -operated equipment; and,
- Locating “noisy” equipment away from the work area to reduce noise exposure to employees on sites controlled by CH2M HILL.

Engineering controls are not a feasible alternative when working at a client facility with client equipment. Unless it is part of the scope of work, do not alter or modify client-owned equipment.

5.2.2 Administrative Controls

Should engineering controls be technically or contractually infeasible, cost-prohibitive, or unable to adequately reduce noise to acceptable levels, the use of administrative controls will be the next applicable option. Administrative controls include:

- Adjusting employee work assignments to move workers in and out of noise areas and maintain their noise exposure below the OEL for the full shift; and,
- Providing noise-exposure training for all people working on projects where noise levels exceed 85 dBA.

5.2.3 Hearing Protection

Appropriate and effective hearing protection shall be provided at no cost to employees when engineering controls or administrative practices cannot eliminate actual or potential noise exposure below 85 dBA TWA, or as a supplement to controlling high noise levels. General requirements for hearing protection use include the following:

- Exposure is above 85 dBA.
- An employee has experienced a STS.
- Actual exposure level is unknown and employees must shout or raise their voices to be heard at a distance of 3 feet (approximately 1 meter).
- Employees must comply with the hearing protection requirements as specified in the site-specific HSP, FSI, and/or AHA.
- Hearing protection must be inspected prior to use and after any occurrence to identify any deterioration or damage.
- Hearing protection must be maintained in a clean and reliable condition. Regular cleaning is important to maintain proper hygiene.
- Prior to inserting ear plugs, the user's hands/fingers must be cleaned.
- Damaged hearing protection shall not be used and must either be properly repaired and restored to its original condition or discarded.

Hearing protection must be selected to meet the individual needs of exposed personnel with consideration of:

- The degree of protection required and appropriately rated for the tasks that meet the specifications adopted by regulatory agencies;
- Suitability for use in the type of work environment and the job involved;
- Comfort, weight, and clamping force of the hearing protector;
- The fit to the user; and,
- The safety of the wearer and fellow employees, such as relating to congestion with other required PPE.

Hearing protection must reduce noise (attenuate) exposure to below OEL and for those who experienced a STS, below 85 dBA TWA. The following method may be used to determine if

the specific hearing protection will adequately reduce the noise level and resulting exposure to the employee:

- **For sound level readings measured on the A- weighting scale:** Subtract 7 decibels from the noise reduction rating (NRR) listed on the hearing protection package, then divide by 2. Next, subtract this figure from the measured or estimated exposure level to determine the reduced sound level in dBA. For example, actual sound level = 95 dBA, NRR = 30, $[(30-7)/2] = 11.5$; $95 \text{ dBA} - 11.5 = 83.5 \text{ dBA}$, the effective noise level at the eardrum.
- **For sound level readings measured on the C- weighting scale:** Divide the NRR listed on the hearing protection package by 2, then subtract this figure from the measured or estimated exposure level to determine the reduced sound level in dBC. For example, actual sound level = 98 dBC, NRR = 30, $[(30)/2] = 15$; $98 \text{ dBC} - 15 = 83 \text{ dBC}$, the effective noise level at the eardrum.
- Refer to Attachment 2 for determining hearing protection effectiveness in Europe and Australia.

The following factors affect the adequacy of hearing protection:

- If hearing protection is not worn for the entire period of exposure to excessive noise, the wearer will be under-protected regardless of the hearing protection effectiveness. The use of a higher-attenuating hearing protector does not compensate for the time that hearing protection is not worn.
- Damaged or poorly maintained hearing protectors will not provide the stated protection. Earmuff cushions should be replaced as soon as they begin to deteriorate and should normally be replaced at least once a year.
- Do not modify hearing protection; it may reduce the attenuation provided and make them unsuitable protection.
- If the seal of an earmuff cushion against the head is interfered with, for example by wearing glasses or spectacles, the attenuation of the device may be reduced by several decibels.
- It is most important that earplugs are fitted properly and wearers are instructed in the proper insertion to achieve the stated attenuation.
- Homemade hearing protectors, such as cotton wool, are not allowed to be worn because they provide negligible hearing protection and may break up when removed from the ear canal, causing medical concerns for the wearer.
- By using double hearing protection (i.e., muffs and plugs), at best, only 5 dB is added to the NRR of the more protective of the two devices.
- Stereo headphones are not to be worn as hearing protection. This practice can be more damaging to the wearer's hearing when substituted for recognized hearing protectors because they provide no protection from noise. Further, the wearer is likely to turn up the volume until the music can be clearly heard above the ambient noise. This not only

significantly increases the noise exposure, but also the wearer is further acoustically isolated from the work environment and may not hear warning signals or instructions.

5.3 Audiometric Testing and Evaluation

Audiometric testing measures hearing acuity at different frequencies to determine whether hearing loss has occurred. Employees shall avoid exposure to workplace and non-occupational noise at least 14 hours prior to an audiometric test. When workplace noise cannot be avoided, hearing protection shall be used.

Audiometric testing is a component of the CH2M HILL medical surveillance program (see HSE 113 for administrative, evaluation, and reporting procedures). Audiometric testing equipment shall be calibrated and operated in compliance with the appropriate government regulations.

5.3.1 Baseline and Annual Audiograms

An initial audiometric test is required at the start of an assignment to a job classification, project, or assignment where noise levels are expected to be at or above the AL.

- The baseline audiogram should be conducted prior to the start of the assignment. When this is not feasible, the audiogram should be conducted as soon as possible but no later than 6 months after first exposure. This is considered the baseline audiogram to compare subsequent audiograms.
- Baseline audiograms are conducted as part of the initial medical examination for employees classified as Hazardous Waste Workers or Safety Coordinators – Hazardous Waste.
- The RHSM will determine the need for CH2M HILL employees who are not designated for audiometric testing as part of a routine medical examination, and any time after the baseline audiometric test. Audiometric scheduling will be coordinated with the SPA.
- An annual audiogram shall be conducted if, at any time during the 12-month period after the baseline or subsequent annual audiograms, the employee is exposed to levels at or above the AL, or when designated by the RHSM, or when the employee selects “yes” on the medical surveillance evaluation form “Are you routinely required to wear hearing protection (i.e., ear plugs or muffs)?”

An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the CCOP:

- A STS revealed by the audiogram is persistent, or
- A hearing threshold shift is indicated in the annual audiogram.

5.3.2 Audiogram Evaluation

- Annual audiograms shall be compared to the baseline audiogram by the CCOP to determine whether a STS has occurred.
- In determining whether a STS has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram.

- If the allowance-adjusted annual audiogram is still determined by the CCOP to have a persistent STS, the annual audiogram may then be substituted as an adjusted baseline audiogram.
- If the CCOP determines that the annual audiogram indicates significant improvement over the baseline audiogram, then this audiogram may be substituted as an adjusted baseline audiogram.

If a STS is identified, the following process will occur:

- The CCOP shall notify the employee and request a retest within 30 days. If the retest confirms a STS, the CCOP shall notify the employee in writing within 21 days of the determination.
- The CCOP shall also notify the SPA. The SPA will in turn notify the RHSM to conduct an investigation into the past and present employee's noise exposure to determine if the hearing loss is work-related and if it is, what control measures must be put into place to prevent further hearing loss.
- If the employee with the STS is still being exposed to high noise levels on the job, the RHSM will make recommendations to protect the employee from further hearing loss, including reevaluating the use of hearing protection or refitting as necessary.

5.4 Records

Noise exposure measurement (noise assessment) records shall be maintained in the project files for at least 2 years. Audiometric test records shall be maintained according to HSE -119, Recordkeeping and Access to Records SOP. Employees shall be provided access to noise exposure and audiometric test records upon request, according to HSE-119, Recordkeeping and Access to Records SOP.

5.5 Subcontractor HSE Oversight

Where subcontractor equipment-noise levels exceed the OEL, the subcontractor is responsible for reducing and maintaining the noise level below 90 dBA. The subcontractor is responsible for implementing suitable controls, including engineering, administrative, and PPE.

The SC shall verify that subcontractor employees are wearing hearing protection, when specified in the written site-specific safety plan. The "Subcontractor Safety Procedure Criteria – Hearing Conservation" listed in Attachment 3 provides the minimum criteria, and may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor's operations. However, CH2M HILL shall not furnish hearing protection to subcontractor employees. Subcontractors shall implement their own hearing conservation program to the satisfaction of the CH2M HILL project manager (in consultation with the SC), when required.

6.0 Training Requirements

Employees who are exposed at or above the AL of 85 dBA are required to complete the on-line Noise Training Module located on the HSE web page of the virtual office. This training involves viewing a video and completing a quiz. Training objectives are:

- Recognize and promote an understanding of the nature of the noise-related health effects, including the cumulative effects of occupational and other noise exposure, such as domestic and/or leisure activities;
- Minimize noise-induced hearing loss by emphasizing engineering noise-control measures as the primary control method;
- Explain the advantages and disadvantages, attenuation, and instructions on the selection, fitting, use, and care of hearing protectors; and,
- Familiarize employees with the purpose of the audiometric testing process and procedures.

This training program shall be repeated each year an employee is exposed at or above the action level. Training shall be updated consistent to changes in PPE and work processes and include the proper techniques of wearing hearing protection.


7.0 Checklists

The “HSE Self-Assessment Checklist – Hearing Conservation” in Attachment 4 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SC and provides this information in the project’s written safety plan. The RHSM shall assist the SSC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing H&S audits at CH2M HILL projects, including subcontractors’ activities.

8.0 Attachments

- Attachment 1: [Calculating Noise Exposure Dose Level and TWA](#)
- Attachment 2: [Hearing Protection Determination for Europe and Australia](#)
- Attachment 3: [Minimal Subcontractor Safety Procedure Criteria](#)
- Attachment 4: [Hearing Conservation Self-Assessment Checklist](#)

9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	4/14/2007	Updated to Standard Operating Procedure	Sean Kriloff; Jeff Stumpf	



Attachment 1: Calculating Noise Exposure Dose Level and TWA

1. Use the following formula to calculate noise exposure dose, in percent.

$$\text{Dose Noise Exposure Level} = 100 (C_1/T_1 + C_2/T_2 + C_n/T_n)$$

Where C is the total time of exposure at a specific sound level, and T is the permitted time of exposure for that sound level as given by Table 1.

Example: Employee works 4 hours in an area where the sound level is 90 decibels, 3 hours at 95 decibels, and 1 hour at 85 decibels. Dose Noise Exposure Level (NEL) would equal 295 percent $[100 (4/8 + 3/4 + 1/16)]$.

Employee's exposure level is above the NEL of 100 percent dose NEL.

2. Use Table 2 to convert dose NEL to an 8-hour time-weighted average.

Example: Dose NEL is equal to 131 percent. From Table 2, 8-hour time-weight average would equal 92 decibels.

Table 1 - Permissible Noise Exposure

Sound Level (decibels)	T - Permitted duration (hours/minutes)	Sound Level	T - Permitted duration (hours/minutes)
80	32 hours	106	52.2 minutes
81	27.9 hours	107	45.6 minutes
82	24.3 hours	108	39.6 minutes
83	21.1 hours	109	34.2 minutes
84	18.4 hours	110	30 minutes
85	16.0 hours	111	26.4 minutes
86	13.9 hours	112	22.8 minutes
87	12.1 hours	113	19.8 minutes
88	10.6 hours	114	17.4 minutes
89	9.2 hours	115	15 minutes
90	8.0 hours	116	13.2 minutes
91	7.0 hours	117	11.4 minutes
92	6.1 hours	118	9.6 minutes
93	5.3 hours	119	8.4 minutes
94	4.6 hours	120	7.5 minutes
95	4.0 hours	121	6.6 minutes
96	3.5 hours	122	5.7 minutes
97	3.0 hours	123	4.9 minutes
98	2.6 hours	124	4.3 minutes
99	2.3 hours	125	3.8 minutes
100	2 hours	126	3.2 minutes
101	1.7 hours	127	2.8 minutes
102	1.5 hours	128	2.5 minutes
103	1.3 hours	129	2.2 minutes
104	1.1 hours	130	1.9 minutes
105	1 hour		

* Permitted duration (hours) calculated using:

$$\text{Permitted duration (hours)} = \frac{8 \text{ hour workday}}{2^{[L-90/5]}}$$

L = Sound Level (decibels) on "A" scale

90 = Noise exposure level

5 = exchange (doubling) rate

Table 2 - Converting dose NEL to an 8-hour time-weighted average (TWA)

NEL %	TWA	NEL %	TWA	NEL %	TWA
10	73.4	105	90.4	360	99.2
15	76.3	106	90.4	370	93.4
20	78.4	107	90.5	380	99.6
25	80.0	108	90.6	390	99.8
30	81.3	109	90.6	400	100.0
35	82.4	110	90.7	420	100.4
40	83.4	111	90.8	440	100.7
45	84.2	112	90.8	460	101.0
50	85.0	113	90.9	480	101.3
55	85.7	114	90.9	500	101.6
60	86.3	115	91.1	520	101.9
65	86.9	116	91.1	530	102.0
70	87.4	117	91.1	550	102.3
75	87.9	118	91.2	570	102.6
80	88.4	119	91.3	590	102.8
81	88.5	120	91.3	610	103.0
82	88.6	130	91.9	630	103.3
83	88.7	140	92.4	650	103.4
84	88.7	150	92.9	670	103.7
85	88.8	160	93.4	690	103.9
86	88.9	170	93.8	700	104.0
87	89.0	180	94.2	720	104.2
88	89.1	190	94.6	740	104.4
89	89.2	200	95.0	760	104.6
90	89.2	210	95.4	780	104.8
91	89.3	220	95.7	800	105.0
92	89.4	230	96.0	820	105.2
93	89.5	240	96.3	840	105.4
94	89.6	250	96.6	860	105.5
95	89.6	260	96.9	880	105.7
96	89.7	270	97.2	900	105.8
97	89.8	280	97.4	920	106.0
98	89.9	290	97.7	940	106.2
99	89.9	300	97.9	960	106.3
100	90.0	310	98.2	980	106.5
101	90.1	320	98.4	990	106.5
102	90.1	330	98.6	999	106.6
103	90.7	340	98.8		
104	90.3	350	99.0		

Attachment 2: Hearing Protection Determination for Europe and Australia

I. European Hearing Protection Determination Calculations

Hearing protection devices shall be CE marked and supplied with the assumed noise protection values (APV) at each octave-band frequency from 63 Hz to 8 kHz and have single figure H(high), M(medium), and L(low) values.

The suitability of the hearing protection requires either an octave band spectrum of the noise or, if not available, both an A-weighted and C-weighted sound pressure levels.

Octave Band Method: Determine the octave band sound pressure levels for the noise of interest. Subtract the APVs of the hearing protectors from these unweighted facility noise levels (L_{eq}). Convert the octave-band levels to dBA by adding the A-weighted corrections given in the table below to each of the values:

Octave Band Center Frequency, Hz	63	125	250	500	1k	2k	4k	8k
A-weighted Correction Factor	-26.2	-16.1	-8.6	-3.2	0	1.2	1.0	-1.1

Logarithmically sum ($SPL_{total} = 10 \log \sum 10^{SPL1/10} + 10^{SPL2/10} + 10^{SPLn.../10}$) the corrected octave band values to obtain an overall dBA level, rounding to the nearest whole number. If this number is less than 82 dBA, the hearing protection is adequate.

HML Method: Calculate the predicted noise reduction level (PNR) using one of the following equations, where H, M, and L are performance values of the hearing protection and L_A and L_C are the A-weighted and C-weighted L_{eq} values of the noise exposures, respectively.

If $L_C - L_A$ is less than or equal to 2,

$$PNR = M - \frac{(H-M)}{4} \times (L_C - L_A - 2)$$

If $L_C - L_A$ is greater than 2,

$$PNR = M - \frac{(M-L)}{8} \times (L_C - L_A - 2)$$

Subtract the calculated PNR value from the A-weighted L_{eq} value of the noise exposure (L_A) and round to the nearest whole number. If this number is less than 82 dBA, the hearing protection is adequate.

II. Australian Hearing Protection Determination Calculations

The class of hearing protection is determined by its SLC₈₀, which will be printed on the packaging. Table 1 below relates the class of a protector to the corresponding SLC₈₀ range and the noise exposure in dBA for which appropriate attenuation is provided.

Table 1

Australian Hearing Protector Classification System		
Class	SLC ₈₀ range [dB]	Noise exposure [dBA]
1	10 to 13	up to 90
2	14 to 17	90 to less than 95
3	18 to 21	95 to less than 100
4	22 to 25	100 to less than 105
5	26 and greater	105 to less than 110
The use of the Classification system is simple. If, for example, an individual has a noise exposure of 97 dBA, then a protector of Class 3 would be chosen. If the exposure level is 100 dBA, then a protector of Class 4 would be suitable.		



Attachment 3: Subcontractor Safety Procedure Criteria — Hearing Conservation

The provided criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor procedures when the use of hearing protection is mandatory based on noise levels. Subcontractors are expected to address at least the following items in their safety procedures.

Minimum Acceptable Criteria for Hearing Conservation:

1. Provide a copy of their safe work practices associated with high noise levels.
2. Provide a copy of their hearing conservation program.
3. Provide list of work areas and activities that will occur for which employees will be exposed to high noise levels.
4. Provide the manner of the sampling strategy to document employee exposure to noise.
5. Provide copies of most recent completed baseline/annual audiograms.
6. Provide copies of completed noise level training.
7. Provide the type, make, and NRR ratings of hearing protectors to be utilized on the project.

Attachment 4: Self Assessment Checklist-Hearing Conservation

HSE Self-Assessment Checklist: HEARING CONSERVATION

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are required to wear hearing protection or are required to perform oversight of a subcontractor using hearing protection or both.

CH2M HILL staff shall not direct the means and methods of subcontractor use of hearing protection nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

- ☐ Evaluate CH2M HILL compliance with its Hearing Protection program (SOP HSQ-108)
☐ Evaluate a CH2M HILL subcontractor's compliance with its Hearing Conservation program
Subcontractor's Name: _____

- Check "Yes" if an assessment item is complete or correct.

Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."

- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1**Yes No N/A N/O****NOISE ASSESSMENT**

1. Employee must shout to converse – conduct hearing assessment
2. A noise survey has been performed
3. All affected employees are included in the sampling strategy
4. Instruments used to conduct noise survey have been calibrated
5. Survey results have been provided to affected employees
6. The employer maintains copies of noise surveys for at least two years

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL

7. Hearing protection required if employee must shout to converse
8. Required hearing protection listed in HSP, FSI, or AHA
9. Hearing protection available for use by employees
10. Hearing protection stored appropriately to prevent deformation or distortion
11. Prior to insertion, users' hands/fingers are in a clean/sanitary condition
12. Hearing protection is maintained in a clean and sanitary condition
13. Damaged hearing protection is not used
14. Signs are posted warning employees of the areas requiring hearing protection

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	No	N/A	N/O
NOISE ATTENUATION cont.'				
15. After NRR is calculated, hearing protection chosen is appropriate for noise levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. If noise levels change, NRR is recalculated to ensure appropriate hearing protection is provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENGINEERING CONTROLS				
17. Engineering controls can be used to minimize noise exposure to personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Are engineering management controls available to reduce the noise exposure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. If technically/economically feasible, client authorizes implementation of engineering controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ADMINISTRATIVE CONTROLS				
20. Employees can be rotated to further reduce exposure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Work assignments/tasks can be moved out of the high noise level areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEARING PROTECTION DEVICES				
22. Hearing protection selected is appropriate for the job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Hearing protection selected does not interfere with the task	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Hearing protector seals are intact and have an effective seal on the users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Hearing protection selected fits the users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Hearing protection selected is appropriate for the job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Hearing protection selected attenuates noise to below 90 dBA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MEDICAL/AUDIOGRAMS				
28. All employees assigned to high noise areas have received their baseline audiogram	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. All employees assigned to high noise areas have received an annual audiogram	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Has an employee suffered a standard threshold shift in their latest audiogram	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TRAINING				
31. Employees have been provided with appropriate training regarding the effects of noise on hearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Employees have been provided with appropriate training regarding the hearing protection devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Employees have been provided with annual training indicating the purpose of hearing protectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Affected employees have been provided with annual training.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

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Health, Safety, Environment Training Program

Enterprise Standard Operating Procedure HSE-110

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) describes the required elements of the CH2M HILL Health, Safety, Environment, and (HSE) Training Program. CH2M HILL Legal Entities and Business Groups (BGs) must comply with this SOP when implementing HSE training programs. The purpose of this SOP is to identify the minimum HSE training necessary to ensure that employees receive the appropriate level of training to conduct their work in accordance with applicable regulations; as well as, to meet CH2M HILL Target Zero Objectives.

2.0 Scope and Application

2.1 Scope

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, independent contractors and temporary employees contracted to CH2M HILL, and subcontractors and their lower-tier subcontractors that operate in the United States (U.S.) and internationally, unless a country-specific SOP is developed.

2.2 Application

Some state's Occupational Safety and Health Administration (OSHA) plans may have more stringent requirements. Contact the appropriate Business Group (BG) Responsible Health and Safety Manager (RHSM) or Responsible Environmental Manager (REM); as appropriate, to address training requirements under specific state run OSHA programs. For international operations, this SOP is to be used as a minimum requirement for worker training, unless country-specific HSE regulations are more stringent. Where there is a variance between this SOP and local regulatory requirements, a country-specific SOP should be developed to comply with specific local HSE regulations.

CH2M HILL's policy is to hire trained and qualified subcontractors to perform work within their capabilities. SOP [HSE-215, Contracts, Subcontracts, and HSE Management Practices](#), provides more information about subcontractor training requirements. As a general rule, Subcontractors are not permitted to attend internal HSE training courses without the approval of the Project Manager, BG HSE Lead or Responsible Health and Safety Manager (RHSM), and the HSE Training Manager. At the discretion of the BG HSE Lead, subcontractor employees may attend non-CH2M HILL-specific general awareness training (OSHA 10-hr Construction or General Industry Awareness courses) provided by an authorized CH2M HILL instructor.

2.3 Applicable Enterprise SOPs

There are numerous Enterprise Standards of Practice and Standard Operating Procedures that address program- or hazard-specific training requirements. These specific training requirements are not duplicated in this SOP, but shall be implemented as necessary based on task or project requirements.

3.0 Definitions

3.1 Competent Person

A *competent person* as one who is **capable of identifying existing and predictable hazards** in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, **and who has authorization to take prompt corrective action** to eliminate them. More information on company competent person practices can be found in Section 5.2.

3.2 Construction

Construction is defined as the erection, renovation/modification, or demolition of a structure, building, and/or facility.

3.3 Employee

Employee includes CH2M HILL full-time, part-time, and flex employees hired and supervised by CH2M HILL. *Employee* also applies to contract or contingent employees who are supervised and directed in their daily activities by CH2M HILL staff

3.4 Hazardous Waste Operations

Hazardous waste operations include the following:

- Cleanup operations required by a governmental body (whether federal, state, local, territory, or other), involving hazardous substances, that are conducted at uncontrolled hazardous waste sites (including sites recognized by any government entity and initial investigations of government-identified sites, which are conducted before the presence or absence of hazardous substances has been ascertained)
- Voluntary cleanup operations at sites recognized by federal, state, local, territory, or other governmental bodies as uncontrolled hazardous waste sites
- Voluntary cleanup operations at sites recognized by CH2M HILL or CH2M HILL clients as uncontrolled hazardous waste sites in International Regions.
- Operations involving hazardous waste that are conducted at treatment, storage, and disposal (TSD) facilities
- Emergency response operations for actual or threatened releases of hazardous wastes or regulated substances

3.5 RHSM

RHSM is a generic term used to describe the Responsible Health and Safety Manager for the region, business group, or program.

3.6 Safety Coordinator (SC)

SCs are trained employees who implement the CH2M HILL HSE program on projects that includes Safety Coordinator – Construction (SC-C), and Safety Coordinator – Hazardous Waste (SC-HW). SCs are assigned this role by the BG Operations Leader (OL) in concurrence with the PM and RHSM.

3.7 Safety Coordinator-Construction (SC-C)

SC-Cs are trained employees who implement the CH2M HILL HSE program on construction type projects. Business Group (BG) Operation Leads (OL) identify eligible staff for SC-C based on tenure with the firm, time spent in the field in similar settings, and their leadership skills. The PM and RHSM verify that the identified Safety Coordinator's training is current using the HandS training database or other verification methods.

3.8 Safety Coordinator-Hazardous Waste (SC-HW)

SC-HWs are trained employees who implement the CH2M HILL HSE program at Hazardous Waste Operation and Emergency Response (HAZWOPER) regulated project sites. The SC-HW is considered equivalent in training and responsibilities as the OSHA Site Safety and Health Supervisor defined in 29 CFR 1910.120(a) (3). Business Group (BG) Operation Leads (OL) identify eligible staff for SC-HW based on tenure with the firm, time spent in the field in similar settings, and their leadership skills. CH2M HILL International Regions will provide training equivalent to the SC-HW curriculum with concurrence from the Enterprise HSE Training Manager, and any country-specific training related to hazardous waste operations or emergency response supervisory duties. The PM and RHSM verify that the identified Safety Coordinator's training is current using the HandS training database or other verification methods.

3.9 Training Provider

Training provider refers to either CH2M HILL computer based training offered on the Virtual Office, CH2M HILL personnel providing classroom training or training via LiveMeeting, training vendors that CH2M HILL contracts with to provide classroom or LiveMeeting training courses, authorized commercial computer-based training providers or community colleges or commercial training providers whose curriculum has been reviewed and accepted by BG HSE Lead (or designee) with concurrence the HSE Training Manager.

3.10 Worker Category

In order to facilitate minimum training requirements, employees are assigned a Worker Category by their Business Group or Region. Operations Lead (OL) or PEP supervisor with assistance from the RHSM or SPA based on the type of work activities they are anticipated to perform throughout the year. Section 5.0 describes the worker categories and associated minimum training requirements in detail.

4.0 Roles and Responsibilities

Listed are the roles and responsibilities required to implement the HSE training program.

4.1 HSE Training Manager (TM)

The HSE Training Manager ensures evaluation and updates of training material, media and courses to make sure that the content is consistent with Enterprise Cores Standards and SOPs; as well as, meets the intent of the regulations and communicates CH2M HILL policies and strategies. Additionally, the HSE Training Manager establishes guidelines and procedures to deliver and record training.

4.2 Operations Leader (OL)

The Business Group OL determines and assigns the appropriate Worker Category (see Section 5.0) for each staff member based on their work assignment, and ensures the training requirements are met by that staff member. The BG OL identifies which staff can be assigned as SC, SC-C, or SC-HW, SC-GI based on the employee's tenure with the firm, time spent in the field in similar settings, and their leadership skills. The PM and RHSM verify that the identified Safety Coordinator's training is current using the HandS training database or other verification methods.

4.3 Project Manager (PM)

The PM will ensure that training needs for the project are identified and resourced through the Business Group (BG) Operations Leader (OL). All staff working on their projects must receive and maintain the training requirements established by their Worker Category (Refer to Section 5.1), ensure the appropriate level of training to conduct their work in a safe and environmentally sound manner, verify they meet the training requirements of the Worker Category, and comply with applicable regulations. The PM works with the Business Group OL and RHSM to designate Safety Coordinator(s) for projects and ensure they have the competency to fulfill that role.

4.4 Responsible Health and Safety Manager (RHSM)

The RHSM provides HS technical guidance and support that includes approving the project HSE plan, identifying training/medical requirements for the project, conducting project audits, designating CH2M Hill project competent/authorized/qualified persons and accepting Subcontractor competent persons. This role may be fulfilled by the BG HSE Lead. The RHSM will work with the BG OL and PM to designate Safety Coordinator(s) for projects, and ensure they have the competency to fulfill that role; and assists the PM to identify, develop and deliver required HSE project training; and designate competent/qualified persons.

4.5 Responsible Environmental Manager (REM)

Provides input to PM to ensure required environmental training needs are defined. The REM provides the technical support and guidance for projects requiring environmental permitting or generating waste, lists the requirements in the project Environmental Plan (EP), and determines the disposal of regulated waste for offices or projects.

4.6 Safety Program Assistant (SPA)

The BG or Region SPA schedules and coordinates HSE training, vaccinations, and medical examinations, as well as, maintains training and medical records in the HandS database

4.7 Employees

Employees are required to maintain the training qualification necessary to perform their assigned duties and job functions. Employees shall coordinate with their Supervisor, PM, Safety Coordinator (if applicable), and SPA to ensure that necessary training is completed and current before beginning work assignments that require that training. Employees shall notify their Business Group OL and SPA when they are no longer assigned to or are performing work activities that require training.

5.0 Program Implementation/Requirements

5.1 Worker Categories

It is CH2M HILL policy to require an appropriate level of HSE training for all employees so they can recognize and mitigate workplace hazards and perform their jobs in a safe and environmentally sound manner, and to comply with applicable regulations.

Worker Categories have been established to assist employees and supervisors in determining the minimum training requirements necessary for the type of work that the employee is assigned to perform.

The Worker Categories have also been instituted to provide a consistent method for tracking and documenting training status for each employee. A summary of the minimum training requirements by worker category is included as **Attachment 2**. Some Business Groups may create additional Worker Categories unique to the tasks or business they perform.

The employee's worker category will be reviewed and confirmed at least annually by their OL or PEP supervisor by using the HandS WC report generated by the BG or Region SPA.

NOTE: An employee's Worker Category may change based on changing work assignments, and/or the employee may have more than one Worker Category based on assigned work scope or International Region location. If an employee falls into more than one category listed below, or works on a site with multiple hazards (e.g., construction and hazardous waste), they must meet the training requirements for each category.

Worker categories are defined as follows:

Enterprise Requirements (ER)

Minimum training requirements for all staff directly employed by CH2M HILL or any of its entities. This is the default Worker Category listed in the HandS recordkeeping database until the OL has assigned – the appropriate Worker Category for their employee. Training for this worker includes:

- New Employee Safety Orientation
 - General Hazard Communication*
 - General lifting safety
 - Ergonomics awareness
 - HSE Commitment Statement

***NOTE:** Workplace Hazardous Material Information System (WHMIS) is the Canadian equivalent of Hazard Communication and required in Canada.

Energized Electrical Trained Worker (EETW)

Energized Electrical Trained Workers (EETW) are CH2M HILL employees or Contingent Workers who have completed the CH2M HILL-Energized Electrical Safety training as part of the requirement to work on or near electric circuit parts or equipment that have not been properly de-energized, locked out, and tagged. Completing the training in this Worker Category is only one portion of the requirements to be considered an Energized Electrical Qualified Person (EEQP). [Refer to HSE-221, Energized Electrical, Section 5.2, Energized Electrical Safety](#) Requirements.

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- 2012 NPFA 70E Energized Electrical Safety
- Release of Victim (annual review)
- Current First Aid, CPR (annual recertification)
- Automated External Defibrillator (AED) as required (annual recertification)

General Office Worker (GOW)

GOWs are CH2M HILL employees or contingent (contract or temporary) workers who work in the office environment 100 percent of their time in an administrative or technical role, and have been assigned this WC by their OL.

- New Employee Safety Orientation for CH2M HILL employees (US/Puerto Rico or International employees)
 - General Hazard Communication*(General lifting safety
 - Ergonomics awareness
 - HSE Commitment Statement
 - Any country specific training identified by the International Responsible Health and Safety - Manager

OR

- New Contingent Worker Safety Orientation (temporary or contract workers)
 - General Hazard Communication
 - General lifting safety
 - Ergonomics awareness
 - HSE Commitment Statement
 - Any country specific training identified by the International Responsible Health and Safety Manager

***NOTE:** Workplace Hazardous Material Information System (WHMIS) is the Canadian equivalent of Hazard Communication and required in Canada.

Mailroom staff (MRS)

MRS are employees who work in the office environment 100 percent of their time assigned to receive, ship, and deliver mail and packages including the shipping and receiving of hazardous materials.

- Enterprise Training Requirements
- Globally Harmonized System (GHS) Dangerous Goods Shipping/DOT training
- Battery Recycling

Office Emergency Responder (OER)

OERs are employees who work in the office environment 100 percent of their time and designated by the office to provide assistance during a medical or building emergency. Their assignment meets the requirement for 10 percent (or adequate number) of office staff as determined by the office safety coordinator and RHSM per SOP [HSE-113, Office and Warehouse Safety Program](#).

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Fire Warden Charter
- Current First Aid and CPR
- Automatic External Defibrillator (AED) training (as applicable),
- Bloodborne Pathogens training (may be included in First Aid class)
- Fire Extinguisher
- Manual Lifting

Site Access Worker

SAWs are employees who require access to field project sites or facilities but do not need to be qualified as a hazardous waste worker or construction site worker. This category includes engineers, scientists, and designers who DO NOT work in a hazardous waste or construction area, who do not enter excavations or permit-required confined spaces, and who do not perform any other potentially hazardous activities that require additional safety training (i.e., electrical safety, ladder safety or fall protection.) Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Field Awareness Safety Training (FAST)
- Business Group (BG) or Project-specific training applicable to the group or type of work performed
- Client facility-specific training

SAWs are required to be escorted by trained and qualified personnel when visiting hazard waste or construction sites.

Facility Operations and Maintenance Worker (FOMW)

FOMW's are employees who could be potentially exposed to hazards (i.e. moving machine parts, toxic gases, exposed energized electrical equipment, hot liquids, chemicals, etc.) while performing work activities in an operating facility (i.e. chemical plant, oil/gas/petroleum facilities, paper mill, process facility, etc.). This category also includes Water and Waste Water Treatment Plant workers. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- General Industry Safety training (e.g. OSHA 10-hour General Industry training)
- Field Awareness Safety Training (FAST) –HSE Module on the VO (Exempt if the employee has completed General Industry Safety Awareness training)
- Energized Electrical Trained Worker – Refer the Worker Category requirements

→ Note: EETW is required only for FOMW performing energized electrical work

- Business group or project-specific training applicable to the type of work performed such as fall protection, confined space entry, ladder safety, blood-borne pathogens (for WWTP if potentially exposed to raw sewage) etc.
- Client facility-specific hazard training

Construction Site Worker (CSW)

CSWs are employees who work unescorted on construction sites. Construction projects are defined as any project involving construction, renovation/ modification, or demolition of a structure, building, and/or facility. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Construction Safety Awareness training
 - Note: The OSHA 10-hour construction safety awareness training course was developed to cover the most common activities/hazards associated with construction projects. However, employees may be exposed to additional activities/hazards which are not covered in this training course.
- Supplementary safety training such as fall protection, confined space entry, lead awareness, trenching/excavation safety, lockout/tagout, ladder safety, scaffolding safety, etc. may also be required depending on project- or facility-specific hazards such as Drug-Free Workplace (except where prohibited).
- Business Group (BG) or Project-specific training applicable to the group or type of work performed
- Client facility-specific hazard training

Direct Hire Construction Craft (DHC)

DHC are employees who perform construction activities such as carpentry, mechanical piping, structural steel erection, electrical work, and masonry. DHCs are usually short-term employees hired for the duration of the specific project only. Training requirements include: Project specific orientation training and any client facility specific hazard training. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Safe Behavior Observation (BG-Specific Hazard Recognition Training)
- Construction Safety Awareness – Classroom
 - Note: OSHA 10-hour Construction Safety is required in the States of NV, MA, CT, RH, NH, MO, & NY
- Project-specific H&S orientation training addressing construction safety hazards
- Regulatory-driven training based on work tasks including but not limited to:
 - Confined Space Entry
 - Fall Protection
 - Aerial Lift
 - Client facility-specific hazard training

Hazardous Waste Worker (HWW)

HWWs are employees who work unescorted on project sites regulated under the HAZWOPER standard. CH2M HILL International Regions will provide an equivalent training curriculum to the HAZWOPER curriculum with concurrence with the Enterprise HSE Training Manager, and any country-specific training related to hazardous waste operations or emergency response. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) Training, 40-hour or 24-hour with applicable On the Job HAZWOPER Training
 - Note: 40 hours of initial training is required unless working only at well-characterized sites where there is no reasonable potential for exposure and where respiratory protection is not required
- Current 8-hour HAZWOPER Refresher
 - Note: May only attend outside course with approval from Enterprise Training Manager and BG HSE Lead
- Annual respirator training and current fit test
 - Note: May be included in HAZWOPER Refresher
- Annual HAZWOPER medical evaluation (physical) and respirator evaluation coordinated with company occupational medical provider
- Remediation Waste Training
- Business Group (BG) or Project-specific training applicable to the group or type of work performed

Hazardous Waste Worker Limited (HWWL)

This category is for those who only make site visits, and do not enter into the exclusion zone, do not conduct sampling, or have the potential for exposure to contaminants. This worker category aligns with those who have been with the company for several years and have moved into a PM role with limited fieldwork. There is not a medical surveillance or respirator fit-test requirement. CH2M HILL International Regions will provide an equivalent training curriculum to the HAZWOPER curriculum with concurrence with the Enterprise HSE Training Manager, and any country-specific training related to hazardous waste operations or emergency response. Core training for this category includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) Training, 40-hour or 24-hour with applicable On the Job HAZWOPER Training
 - Note: 40 hours of initial training is required unless working only at well-characterized sites where there is no reasonable potential for exposure and where respiratory protection is not required
- Current 8-hr HAZWOPER Refresher
 - Note: May only attend outside course with approval from Enterprise Training Manager and BG HSE Lead

- Business group- or Project-specific training applicable to the type of work performed, such as fall protection, confined space entry, excavation and trenching, lead awareness, etc.
- Client facility-specific hazard training

Laboratory Worker (LW)

Laboratory workers are those who work in analytical laboratories as their primary job function. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Laboratory Safety Awareness
- Initial and exit Laboratory Worker medical examination
- Additional safety training such as laboratory-specific training as required by the BG, project- or facility-specific hazards

Safety Coordinator Categories

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific Health and Safety Plan/FSIs for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (e.g., construction, hazardous waste, or both). Further, the SCs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (i.e., fall protection, excavation, etc.). All SC categories are required to maintain their designation by completing at least two, 1-hour modules every three years by Live Meeting. The modules are selected based on the current SC needs or updates in regulatory or company practices. Frequently asked questions (FAQs) about SCs are included in Attachment 3. Following are the safety coordinator categories training requirements:

Safety Coordinator – Initial (SC)

This training is the initial training required for all Safety Coordinator categories. It contains basic safety management information, SC responsibilities, and processes used to develop project-specific safety plans, manage subcontractors, and implement a written project safety plan. SCs are workers who implement CH2M HILL safety programs and procedures for non-construction and non-hazardous waste field projects that require FSIs for projects that include facility walkthroughs, surveying, sampling, and wetlands field activities. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Initial Safety Coordinator
- Field Awareness Safety Training (FAST) (Note: this module is not required if employee has completed Construction Safety Awareness or General Industry Awareness training)
- Blood-borne Pathogens (may be included in First Aid class)
- Awareness Training: Environmental Program
- Waste Management Training
- Dangerous Goods Shipping

- Fire Extinguishers
- First Aid/CPR/AED
- Additional safety training such as fall protection, confined space entry, lead awareness, trenching/excavation safety, lockout/tagout, ladder safety, scaffolding safety, etc. may also be required depending on BG, project- or facility-specific hazards.

Safety Coordinator—Construction (SC-C)

SC-Cs are employees who manage safety for construction field projects. Construction projects are defined as any project involving construction, renovation/modification, or demolition of a structure, building, and/or facility. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Initial Safety Coordinator - Refer to Worker Category course requirements
- Safety Coordinator—Construction
- Construction Safety Awareness - classroom (e.g. OSHA 10-Hour Construction Awareness) **OR** 4-day Construction Safety Awareness (OSHA 30-hour Construction Safety).
→ Note: Both as required by specific US State programs in NV, MA, CT, RH, NH, MO, & NY
- Safety Coordinator Refresher (Requires 2 modules every 3 years)
- Additional safety training such as fall protection, confined space entry, lead awareness, trenching/excavation safety, lockout/tagout, ladder safety, scaffolding safety, etc. may also be required depending on project- or facility-specific hazards.

Safety Coordinator—Hazardous Waste (SC-HW)

The SC-HW is an employee who manages the health and safety for HAZWOPER regulated projects. Successful completion of the SC-HW course meets the OSHA HAZWOPER training requirement for Management and Supervisor training. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Hazardous Waste and Emergency Response Operations (HAZWOPER) Training (40-hour-Classroom)
- Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) Training, 40-hour or 24-hour with applicable On the Job HAZWOPER Training
→ Note: 40 hours of initial training is required unless working only at well-characterized sites where there is no reasonable potential for exposure and where respiratory protection is not required
- Current 8-hour HAZWOPER Refresher
→ Note: May only attend outside course with approval from Enterprise Training Manager and BG HSE Lead
- Annual respirator training and current fit test
→ Note: May be included in HAZWOPER Refresher

- Initial Safety Coordinator - Refer to Worker Category course requirements
- Safety Coordinator- Hazardous Waste
- Safety Coordinator Refresher (requires 2 modules every 3 years)
- Remediation Waste Management
- Baseline and/or Periodic Medical Surveillance
- Additional safety training such as Construction Safety Awareness or General Industry Awareness, fall protection, confined space entry, lead awareness, trenching/excavation safety, lockout/tagout, ladder safety, scaffolding safety, etc. may also be required depending on project- or facility-specific hazards.

Safety Coordinator – Office (SC-O)

SC-O is an employee trained to perform collateral duty, not typically Health and Safety Professionals, responsible for implementing the Office/Facility HSE compliance tasks and tracking.

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Office Safety Coordinator Training
- Emergency Responder – Office (OER) Training Requirements
- Dangerous Goods Shipping

Safety Coordinator – General Industry (SC-GI)

SC-GIs are employees who manage or oversee health and safety tasks in a general industry or facilities work environment. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Initial Safety Coordinator – Refer to Worker Category course requirements
- Safety Coordinator – General Industry Training
- Safety Coordinator – Refresher
- General Industry Safety Awareness (e.g. OSHA 10-hour General Industry Awareness) OR 4-day Supervisor General Industry (e.g. OSHA 30-hour curriculum) as required by assignment that can include (See Attachment 8 for further reference):
 - Aerial Lift
 - Asbestos Awareness
 - Confined Space Entry
 - Electrical Safety
 - Fall Protection
 - Fire Extinguisher
 - Ladders
 - Lead Awareness
 - Lockout/Tagout
 - Personal Protective Equipment
 - Forklift
 - Bloodborne Pathogens
- First Aid/CPR
- Automatic External Defibrillator (AED) – as applicable

- Behavior Based – Loss Prevention System
- Energized Electrical Safety – Refer to EETW Worker Category
→ Note: Required only when assigned to work on energized electrical systems
- Noise (Hearing Conservation)
- Smith Driver Direct On Road Defensive Driving Course
- Smith Driving Small Vehicle Backing
- Smith Driving Small Vehicle Forward Motion
- Traffic Control
- Awareness Training: Environmental Program

Onsite Environmental Manager (OEM)

The OEM is the employee responsible for overseeing the project environmental compliance requirements. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Field Awareness Safety Training
- Waste Management Training (or equivalent approved by Enterprise Environmental Director)
- Remediation Waste Management
- Dangerous Goods Shipping/DOT training
- Awareness Training: Environmental Program
- Awareness Training: Chemical Mgmt at Construction Sites
- Awareness Training: Air Compliance
- Awareness Training: Petroleum Storage
- Awareness Training: Waste Management (or equivalent as approved by Enterprise Environmental Director)
- Awareness Training: Natural & Cultural Resources
- Awareness Training: Construction Site Storm Water Runoff

Project Manager/Site Supervision (PMSS)

The PMSS is the project manager or person designated as having site supervision responsibilities. Core training for this worker includes:

- Enterprise Training Requirements
- Global Harmonized System (GHS)
- Fundamentals of Project Manager – Module 9
- Initial Safety Coordinator Training – Refer to Worker Category course requirements
- Safety Coordinator- Construction or Safety Coordinator-Construction/HAZWASTE (when the PM is also assigned this role)
- Additional safety training such as Construction Safety Awareness or General Industry Safety Awareness (e.g. OSHA 10-hour or 30-hour course or equivalent) training as required by the BG, project- or facility-specific hazards.

5.2 Competent Person Designation

Various OSHA and international regulations require that a specific individual be designated as a *competent person* to oversee specific work activities. The OSHA definition is described in

section 3.1 of this SOP, although some regulations broaden this definition. For example, the excavation standard requires the *competent person* to also have knowledge of protective systems and soil classifications.

The designation of *competent person* is a specific position of authority for a particular activity with defined roles and responsibilities and, in some cases, requisite qualifications. CH2M HILL's practice is the employer responsible for directing the means and methods of an activity (typically the employer responsible for actually performing the work) are also responsible for designating the qualified *competent person* for that activity. This is typically our subcontractor or a third party contractor, unless CH2M HILL is actually self-performing the work.

Should CH2M HILL self-perform work and an employee needs to be designated as a competent person, the CH2M HILL site or project manager shall coordinate with the BG HSE Lead or RHSM to verify that the employee has the requisite training and experience to be identified as the competent person.

Designation as a CH2M HILL competent person for an activity must be approved and documented by the PM and RHSM. The documentation supporting the competent person designation (training, experience, competent person activity) shall be maintained in the project training file. The RHSM will review and accept subcontractor competent persons.

Identifying and designating a competent person is especially important on multi-employer work sites where CH2M HILL may have contracted subcontractors to perform portions of the work, or where CH2M HILL is working alongside third-party contractors since OSHA regulations do not specify which employer is responsible for designating the *competent person*.

When CH2M HILL is working alongside third-party contractors, the project staff will need to rely on their expertise that it is safe to enter areas under their responsibility. For further guidance, refer to HSE-215, [Contracts, Subcontracts, and HSE Management](#).

CH2M Hill does not necessarily rely on the competent person's judgment alone and they remain responsible for their own safety by recognizing and avoiding unsafe conditions. When unsafe conditions are identified, staff shall notify the *competent person* and ensure that appropriate control measures are implemented.

5.3 Training Program Implementation

HSE training is determined and initiated by:

1. An employee is assigned a Worker Category (may have more than one)
2. The Supervisor (Operations Leader, Frontline Supervisor), Project Manager or the Responsible Health and Safety Manager may request specific training
3. The Site-Specific Written Safety Plan, which may include additional Client required training

All required training will be completed before a worker is assigned duties requiring training or qualification. Where periodic retraining or requalification requirements apply, workers whose training has lapsed will not be allowed to perform the specific tasks addressed by the lapsed training.

The BG or Region SPA must produce at a minimum, quarterly HandS status reports on compliance with meeting HSE training, medical, requirements, and worker category designation.

5.4 Interim Qualification

Interim qualification is a method of temporary qualification. Interim qualification will not be routinely utilized and will be reserved for unplanned and unanticipated situations. The intent of an interim qualification is to allow management to temporally staff a position with an individual who, by virtue of related experience or qualification, is fully capable of safely performing minimum job duties.

This process will be reserved for conditions where no other reasonable means are available to staff a critical position within an appropriate timeframe. The RHSM and the Project Manager, with proper documentation and with concurrence from the HSE Training Manager, may approve interim qualification. Documentation paperwork can be obtained from either Attachment 4 of this SOP or from the HSE Training Manager.

Interim qualification will be issued for a limited and specified period, based on a reasonable duration to allow replacement or completion of full qualification.

5.5 Extensions of Qualification

Extensions on qualification may be granted on a case-by-case basis in order to support operational commitments.

The RHSM/BG HSE Lead and the Project Manager, with proper documentation on a case-by-case basis and with concurrence from the Training Manager, may approve an extension of time for retaining those qualifications under the internal control of CH2M HILL.

Requests for extension must be submitted in writing (Attachment 4: Request for Extension of Qualification), contain the length of the extension, and the explanation of the circumstances that prevented the person from completing the requirements. Compensatory actions, if necessary, must be identified. Approved extension requests will be noted in the employee's electronic training file.

5.6 Credit for Training and Experience

A request for credit for training may be granted based on previous training, education, and/or experience and must demonstrate the knowledge and skills addressed by the course for which they request credit.

Unless there is a specific regulatory prohibition, requestors may be granted credit by the HSE Training Manager for training in the following instances if the requestor:

1. Provides sufficient evidence of previous training, education and/or experience to indicate proficiency with the training objectives, or
2. Is a training staff member with primary administrative responsibility for the training subject? For example, an employee who prepares, administers and grades a written examination need not take the examination, or
3. Is the Subject Matter Expert for the course subject or examination?

The request for credit (Attachment 5: Request for Credit for HSE Experience) must include documentation of the basis of the exception.

Credit for training is effective for the same period as a successful course completion. If Refreshers are required, the employee is required to attend in the appropriate time period.

5.7 Refresher Training

When dictated by regulation or a training entity who certifies completion of specified training (i.e., American Red Cross, American Heart Association), employees must complete the required re-training or refresher training in the specified timeframe in order to continue performing associated work. The Enterprise does not recognize a “grace period” for CPR or first aid training once it has expired.

Following are requirements for OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Refresher Training.

Hazardous Waste Worker 8-hour Refresher Training, 29 CFR 1910.120/1926.65 (e) (8)

Hazardous waste workers shall attend an 8-hour refresher course annually (within 12 months) in accordance with 29 CFR 1910.120/1926.65 to maintain qualification to work in the field. This requirement is met by attending a CH2M HILL 8-hour refresher course offered by the Enterprise HSE training group. Use of an external (non-approved) training source is discouraged and must be pre-approved by the BG HS Lead/RHSM and the HSE Training Manager.

Workers shall not work in contamination reduction zones or exclusion zones of hazardous waste sites after the expiration date of refresher training. An exception is granted for workers who have documentation that they are enrolled in an upcoming refresher class that is scheduled within 30 days of their expiration date. The worker is responsible for contacting the Safety Program Assistant (SPA) or designated training coordinator to sign-up for an upcoming 8-hour refresher course and obtaining documentation for continued work.

Note that some projects, clients, and/or states may have more restrictive policies regarding the time frame for completion of the 8-hour refresher course.

If four years have passed since the initial (40- or 24-hour) training or attendance at an 8-hour refresher course, the worker must obtain written RHSM approval to attend an 8-hour refresher course and maintain hazardous waste worker qualification. RHSM approval in concurrence with the Enterprise HSE Training Manager is given on a case-by-case basis and may include an evaluation of worker competency in required areas, passing a knowledge assessment (e.g. written test), and completing any assigned remedial training in addition to attending the 8-hr refresher.

If more than four years have passed since the initial training or attendance at an 8-hour refresher course, the worker must repeat the initial 40- or 24-hour training.

5.8 OSHA 10/30-Hour Construction and General Industry Training

A standard OSHA 10 and 30 hour Construction Safety training platform has been developed by the Enterprise HSE staff for use by the Business Groups. The course content is designed to meet OSHA requirements, and is transferrable from one BG to another so long as it presented by an accredited OSHA instructor, consistent with the minimum mandatory

training topic, and the duration of the class is met, as required by OSHA. Refer to Attachment 7 for the OSHA 10 and 30 hour curriculum requirements, listing the mandatory modules along with the elective and additional modules. This allows an OSHA 10 or 30 hour course to be presented based on the various risks and hazards associated with a BG or specific project.

Completing one-day construction safety awareness training equivalent to the OSHA 10-hour Construction Safety training is a requirement for the CSW worker category. Completing the one-day general safety awareness training equivalent to the OSHA 10-hour General Industry Safety training is a requirement for the FOMW worker category. Refer to Attachment 8 for the OSHA 10 and 30 hour curriculum requirements, listing the mandatory, elective, and optional modules.

Completing the OSHA 30-hour Construction Safety training is optional for the CSW or PM worker categories, although the BGs may elect to have it as required training. Although it is not currently required by Federal OSHA regulation to complete 10 or 30-hour Construction Safety training, with training requirements in the States of Nevada, Massachusetts, Connecticut, Rhode Island, New Hampshire, Missouri, and New York. It is recommended that CH2M HILL employees who are required to attend OSHA 10/30-hr Construction or General Industry training repeat the course every **five** years, or as mandated by state regulation, in order maintain awareness and education regarding HSE regulatory requirements, standards, programs, and procedures.

5.9 Schedules and Registration

Classroom Course Registration

Employees may register for HSE classroom courses by using the on-line HSE training calendar located on the Virtual Office (access via the HSE Webpage). To register for 40-hr or 24-hr HAZWOPER training, employees should use the Training and Medical Enrollment Form located on the HSE Webpage on the Virtual Office.

When an enrollment form is submitted by the employee, or when an employee registers for a course using the on-line calendar, the request is electronically forwarded to the employee's Supervisor for review and approval. Once the supervisor approved training request is forwarded to the appropriate SPA and the employee is enrolled in the course.

If an employee does not have access to the Virtual Office, they shall contact their SPA or training coordinator to register for the necessary training.

Online Course Completion

Computer-based courses on the CH2M HILL Virtual Office can be taken at any time. The online courses are completed by taking the linked test. If the test score is sufficient, the course completion is automatically documented. If the score is insufficient, the employee will redo the course until they achieve a passing score.

If the employee does not have access to the Virtual Office, he or she may contact the SPA to receive a hard copy version of the training course and the examination. Upon completion of the examination, the employee forwards it back to the SPA for grading and acknowledgement of course completion.

Some BGs and International Theaters utilize external computer-based training that has been approved by the BG HSE Lead and HSE Training Manager. Directions for completing these on-line courses are provided to the employee as necessary.

5.10 Course Completion

Employees are required to complete the necessary training course(s) successfully to be qualified for work activities.

Successful completion consists of obtaining a passing score on all courses that include quizzes, or attending and participating in all classroom courses to the satisfaction of the instructor.

If an employee fails a classroom course, the RHSM will follow up with the employee and provide additional training. Once the RHSM is satisfied that the employee understands the information and can perform work activities safely based on the materials, the RHSM will notify the employee and the SPA. The employee will then be credited with passing the course.

Employees who fail a computer-based course can retake the course and examination. If the employee continues to experience difficulty successfully completing the course, he or she should contact the RHSM for assistance.

Some courses require periodic refresher training to maintain a qualification certification for the initial training. To remain qualified to conduct work activities, the employee must successfully complete the appropriate refresher-training course(s).

5.11 Training Course Funding

HSE training courses are funded through corporate HSE, business group, and business group HSE budgets; as well as, by projects for site specific training needs. The employee's Supervisor, SPAs or RHSMs will provide charge numbers. Questions should be directed to the Supervisor or SPA.

6.0 HSE Training Delivery

HSE training consists of a variety of material, media and courses (classroom sessions, computer-based training, videos, and other informal venues, such as safety briefings or written information) designed to address the potential hazards and risks of the tasks and locations where an employee performs their work.

The delivery (computer, video, classroom, etc.) of the material, media and courses is designed to:

1. Provide uniformity in learning objectives,
2. Communicate and build a strong "Target Zero" culture,
3. Provide flexibility for BGs in how training is conducted; and
4. To comply with regulatory drivers.

These requirements have been set to provide uniformity and consistency in meeting the learning objectives for each course. Any deviation from the course format, vendor, or delivery method designated in this SOP requires consultation and acceptance with the HSE Training Manager. The acceptance by the HSE Training Manager ensures that training is

provided in a manner that meets corporate expectations, regulatory drivers, and the quality to ensure valuable learning experiences for staff.

The HSE training for contract or contingent employees may be provided through CH2M HILL courses or through external courses. External HSE courses must be acceptable to meet regulatory and CH2M HILL training requirements consistent with the assigned Worker Category and for

Training delivery shall come from qualified and accredited/approved resources that will be approved by the HSE Training Manager, and BG HSE Lead/RHSM. Trainers, both company employees and vendors, must have the combination of education, experience, and proficiency to present the coursework they are assigned to instruct. They shall have current qualification to instruct the course as required by regulatory agency, governing professional organization, or other recognized authority. Examples include qualification by OSHA to instruct the 10 or 30-hour Construction Safety Training, and CPR/First Aid/AED by the Red Cross, American Heart Association or Cardiac Science. For CH2M HILL-specific annual OSHA 8-hour Refresher, internal and external trainers must complete the Train-the-Trainer presented by HSE Training Manager and RHSM.

Note (Equivalency Training/Trainer's demonstration of knowledge through experience): In some instances, equivalency training may be accepted. These cases will be addressed on a case by case basis prior to authorizing someone to attend/teach. For example (First Aid/CPR Training), we will need to ensure that the trainers are approved instructors and they offer proficiency testing. The Enterprise will not recognize/accept CPR or first aid training that does not offer proficiency testing.

Use of an internal/external (non-approved) Instructor's who have not attended "Train the Trainer" programs is discouraged and must be pre-approved by the BG HSE Lead/RHSM and the HSE Training Manager.

6.1 Computer-Based Courses

Most computer-based courses have learning goals that focus on a single topic or a single type of hazard information. The focused nature of material makes computer-based training a valuable and efficient way to convey the knowledge about the topic.

Credit for the completion of CH2M HILL online computer-based training courses that are located on the Virtual Office is automatically recorded in the employee's training record in the Enterprise Training database (HandS). The HSE Training Manager shall be consulted when computer based courses outside of the Virtual Office are used, and records for these courses must be entered into the HandS database and certificates maintained by the SPA or designated BG training coordinator.

For courses such as Construction Safety Awareness (e.g. OSHA 10-hr Construction Safety), a class-room delivery method is preferred over a computer-based course for employees that are active field employees; however it is recognized that some BGs utilize approved on-line training providers for employees who are not considered active field Construction Site Workers or assigned as Safety Coordinators.

6.2 Classroom-Based Courses

Classroom-based courses may have learning goals that include multiple topics or more complex single-topic areas. In addition, the classroom interaction with peers and instructors adds value to the learning experience. Material for these courses is developed to ensure that CH2M HILL policies and procedures are included as part of the learning goals.

Classroom-based courses are taught by qualified HSE staff or professional contract instructors.

Any of the HSE staff that wishes to conduct training must notify the HSE Training Manager of their intent for the training. This allows for the management of course materials, ensures the training schedule is current for any staff needing the course, and provides quality control.

6.3 External Courses

Courses provided outside of CH2M HILL are intended for specialized, low-demand training that isn't cost effective to provide 'in-house.' These courses are not intended to take the place of classes typically offered by CH2M HILL.

The exception to this is when there is no reasonable (cost and time effective) alternative other than sending an employee to an outside course.

The SPAs in each BG will work with local providers to schedule external classes. If the SPA has any questions about a request for an external course, he or she should contact the Training Manager for clarification.

6.4 Live Meeting Courses

Courses may be delivered in a LiveMeeting format. Examples are the Safety Coordinator Construction (SC-C), Hazardous Waste (SC-HW) Refreshers, Office Safety Coordinator (OSC) or the Behavior-Based Loss Prevention System (BBLPS) Training. This format is particularly useful for focused delivery, over distance and over time. Using LiveMeeting for presenting courses over **2 hours** in duration or that require group participation is discouraged, and must be approved by the Enterprise HSE Training Manager and BG HSE Lead.

6.5 On-The-Job Training

"On the Job" (OJT) training is required by some regulations. For example, OSHA's Hazardous Waste Operations and Emergency Response regulation 1910.120 mandates that "Workers...shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained experienced supervisor." When required, OJT shall be documented, utilizing the form in Attachment 6: HAZWOPER - On the Job Training (OJT) Form or equivalent, and forward copies to the SPA or designated training coordinator for inclusion in the employees' training record.

7.0 Recordkeeping and Certificates

All training records shall be maintained in accordance with SOP [HSE-119, Recordkeeping](#). The Hands database is the online training and medical surveillance management tracking tool.

1. For externally approved courses, employee must provide a copy of the training certificate to the designated SPA or BG training coordinator.
2. For internal Classroom courses, a class roster will be submitted to the designated SPA or BG training coordinator for data entry and record retention.
3. For internal Classroom courses, students will complete a training evaluation form, with a copy given to the Instructor and to designated SPA or BG training coordinator.
4. When computer based courses outside of the Virtual Office are completed, records for these courses must be scanned into the HandS database.

Note: The employee should receive a certificate directly from an external vendor. It is the employee's responsibility to maintain the original training certificate for his or her records. The employee shall copy the certificate and send the **copy** to his or her SPA. The SPA will enter course credit into the HandS training data base as well as scan the training certificate into HandS.

8.0 Attachments

Attachment 1:	Applicability and Scope of HAZWOPER Requirements
Attachment 2:	Summary of Minimum Training Requirements by Worker Category
Attachment 3:	Frequently Asked Questions about the Safety Coordinator Role
Attachment 4:	Request for Extension of Qualification
Attachment 5:	Request for Credit for HSE Experience
Attachment 6:	HAZWOPER – On the Job Training (OJT) Form
Attachment 7:	OSHA 10 and 30-hour Construction Safety Training Guidelines
Attachment 8:	OSHA 10 and 30-hour General Industry Safety Training Guidelines

9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By:
2	02-11-2008	Updated SOP; revised worker categories, added methods of training, included new forms of course enrollment	Stephanie DeWitt	<i>R. Keith Christoph</i>
3	6-30-2008	Add sentence to 5.7 The Enterprise does not recognize a "grace period" for CPR or first aid training once it has expired.	Stephanie DeWitt	<i>R. Keith Christoph</i>
4	02-17-2010	<p>Added 24/40hr OJT component to the Hazwaste Worker Category</p> <p>Added Attachment 6 HAZWOPER – On the Job Training (OJT) Form</p> <p>Added statement on refresher requirement to maintain SC designation</p> <p>Added clarification to section 6.0 – Training Delivery on requirements for approving trainers and resources,</p> <p>Removed Hazwaste Worker Limited Worker Category.</p> <p>Added Office Emergency Responder and Mail Room Staff Worker Categories</p> <p>Added section requirements for completing 10 and 30-Hour Construction Safety training and allowance for transferring course completion from one BG to another</p> <p>Added Attachment 7 describing OSHA 10 and 30-hour Construction Safety guidelines</p>	<p>Steve Beck</p> <p>Jeff Stumpf</p> <p>Carl Woods</p> <p>Bret Clausen</p>	<i>R. Keith Christoph</i>
5	06-26-12	<p>Updated Section 5.1, Worker Categories, and Attachment 2, Summary of Minimum Training Requirements by Enterprise Worker Category</p> <p>Updated Attachment 7, OSHA 10-hour and 30-hour Construction Course Guideline and Checklist</p> <p>Added Attachment 8, OSHA 10-hour and 30-hour General Industry Guideline and Checklist</p>	<p>Steve Beck</p> <p>Jeff Stumpf</p> <p>Petra Scotti</p>	<i>Angelo Liburdine</i>
6	06-15-13	Addition of Energized Electrical Trained Worker (EETW) as a	Jeff Stumpf	

Revision	Date	Description	Prepared By	Approved By:
		worker category. Revised General Office Worker (GOW) to include CH2M HILL employees and Contingent Worker. Addition of Global Harmonized System Hazard Communication training requirement to applicable Worker Categories. Clarification on hazardous waste training for international employees. Revised time period for retaking the OSHA 40-hour HAZWOPER training due to missed OSHA 8-hr Refresher from three to five years. Revised training course descriptions in Attachment 2 for more global applicability		<i>Angelo Liburdine</i>

Attachment 1: Applicability and Scope of HAZWOPER Requirements

This document integrates federal OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard requirements, federal OSHA interpretations, industry practice, and CH2M HILL policy. The objective of this document is to provide background and clarity on actions necessary in meeting training, medical surveillance, and respirator fit test requirements. CH2M HILL International Regions will provide HAZWOPER equivalent training, medical surveillance, and respirator fit test requirements with concurrence from the Enterprise HS Programs and Services Director, and to meet any country-specific training related to hazardous waste operations or emergency response. Additional details or questions should be referred to BG HSE staff.

No HAZWOPER Training or Medical Requirements

If they can avoid entering a HAZWOPER site, as described above, then workers are not required to complete HAZWOPER training. If the HAZWOPER standard does not apply at all to a given location, then no further action is necessary.

Limited HAZWOPER Training

If a worker can't "avoid entering" a HAZWOPER site (i.e., the worker must enter areas or participate in activities that fall under the scope of the HAZWOPER standard), then the next alternative includes 24-hour HAZWOPER training, current annual 8-hour refresher, and typically no medical surveillance. Twenty-four-hour training without medical surveillance is acceptable if all of the following conditions are met:

- Work does not require the use of respiratory protection
- Exposure is below the action levels outlined in the project-specific written safety plan
- Work does not include investigation/characterization of new area or hazard (e.g., participation in site characterization sample collection)

If these limitations are exceeded (e.g., the worker needs to collect site characterization samples), then 40-hour training and medical surveillance are needed.

Treatment Systems and Facilities at Contaminated Sites

Resource Conservation and Recovery Act (RCRA)-permitted facilities are covered separately by the HAZWOPER standard. Although most contaminated site treatment systems and facilities are not strictly permitted under RCRA, for the purposes of interpreting the HAZWOPER standard, OSHA treats them as permitted facilities. This is because the site is part of an environmental cleanup action but is well characterized, understood, and includes a controlled process.

Approaching or entering the system or facility while operating with contaminated media requires that staff comply with the limited HAZWOPER training requirements. This

condition is true even when the treatment process is contained and without regard to demonstrating that there is no reasonable possibility of exposure during operation. The basis for this is that OSHA considers there is always a reasonable possibility for an emergency at treatment facilities, and therefore there is a reasonable possibility of exposure during operation.

Impact to Staffing

40-hour trained Hazardous Waste Workers:

- US based staff that are in the INC entity and Canada based staff in CAN entity are typically in the CH2M HILL “recovery program”, and can incur the HSE recovery charge associated with their labor.
- Require entrance into the medical surveillance program.
- Have unrestricted access to all areas of the site and site activities.
- Require annual 8-hour refresher training.
- Require an annual fit test if working in an area that requires the use of respiratory protection.

24-hour trained Hazardous Waste Workers:

- US based staff that are in the INC entity and Canada based staff in CAN entity are typically in the CH2M HILL “recovery program”, and can incur the HSE recovery charge associated with their labor.
- Usually do not require entrance into the medical surveillance program.
- Are restricted from participating in site-characterization sample collection and/or working in areas that require the use of respiratory protection.
- Require annual 8-hour refresher training.
- Do not complete an annual fit-test.

Non-HAZWOPER workers:

- Are required to meet other training requirements according to the nature of their work.
- Must adhere to project-specific written safety plan requirements if they work adjacent to hazardous waste site activities or areas.

Applicability and Scope of HAZWOPER Requirements

OSHA’s HAZWOPER standard applies to “... Cleanup operations required by a governmental body ... involving hazardous substances ... [and] Corrective actions involving cleanup operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) ... [and] Voluntary cleanup operations at sites recognized by ... governmental bodies as uncontrolled hazardous waste sites unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards.” It is important to note that although the standard does not apply when there is no reasonable possibility for exposure, the employer must demonstrate that such a no-exposure situation exists. CH2M HILL needs

Attachment 1: Applicability and Scope of HAZWOPER Requirements (continued)

to demonstrate no-exposure through site history, available characterization data, and real-time air monitoring or air sampling.

Questions arise often about where the boundaries are drawn for a HAZWOPER site and therefore where and at what level workers are required to complete HAZWOPER training. The site boundaries are dictated by activities and exposure more than by property lines.

OSHA's interpretations state, generally, that the HAZWOPER site applies to workers when (1) they enter an exclusion (contaminant) zone, (2) they enter a decontamination zone, (3) they enter an area where wastes are stored or treated, and (4) they are otherwise potentially exposed to hazardous substances. It is important to note that (1) the term "exposure" refers to exposure at levels below the permissible exposure level (PEL), not to over-exposure (i.e., exposure at levels above the PEL), and (2) exposure includes all potential routes of entry (e.g., dermal and ingestion through contact).



HSE Training

Standard Operating Procedure HSE-110

Attachment 2: Summary of Minimum Training Requirements by Enterprise Worker Category

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
Construction Site Worker (CSW)	CSWs are employees who work unescorted on construction sites. Construction projects are defined as any project involving construction, renovation/modification, or demolition of a structure, building, and/or facility.	<ul style="list-style-type: none">• Enterprise Requirements• Construction Safety Awareness (e.g. OSHA 10-hr Construction Safety) Note: OSHA 10-hour Construction is required in the US States of NV, MA, CT, RH, NH, MO, & NY• Global Harmonized System (GHS)• Business group- or Project-specific training applicable to the type of work performed, such as fall protection, confined space entry, lead awareness, NFPA 70E, Ladder safety, scaffolding safety, etc.• Client facility-specific hazard training	<ul style="list-style-type: none">• HSE VO• Classroom• Classroom or HSE VO• Classroom or HSE VO dependent on training
Direct Hire Construction Craft (DHC)t	DHC are employees who perform construction activities such as carpentry, mechanical piping, structural steel erection, electrical work, and masonry. DHCs are usually short-term employees hired for the duration of the specific project only. Training requirements include:	<ul style="list-style-type: none">• Enterprise Requirements• Safe Behavior Observation (BG-Specific Hazard Recognition Training)• Global Harmonized System (GHS)• Construction Safety Awareness: (e.g. OSHA 10-hr Construction Safety) Note: OSHA 10-hour Construction is required in the US States of NV, MA, CT, RH, NH, MO, & NY• Project-specific H&S orientation training addressing construction safety hazards• Regulatory-driven training based on work tasks including but not limited to:<ul style="list-style-type: none">- Confined Space Entry- Fall Protection- Aerial Lift- <i>Client facility-specific hazard training</i>	<ul style="list-style-type: none">• HSE VO• HSE VO• Classroom or HSE VO• Classroom• Classroom• Classroom or HSE VO dependent on training

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
	Project specific orientation training and any client facility specific hazard training.		
Emergency Responder-Office (OER)	OERs are employees who work in the office environment 100 percent of their time and designated by the office to provide assistance during a medical or building emergency. Their assignment meets the requirement for 10 percent (or adequate number) of office staff as determined by the Safety Coordinator - Office (SC-O) and Responsible Health & Safety Manager (RHSM) per SOP HSE-113, Office and Warehouse Safety Program.	<ul style="list-style-type: none"> • Enterprise Requirements • Global Harmonized System (GHS) • First Aid/CPR • Automatic External Defibrillator (AED) training (as applicable), • Fire Extinguisher (Initially and annual refresher required) • Bloodborne Pathogens (may be included in First Aid class) • Manual Lifting • Fire Warden Charter 	<ul style="list-style-type: none"> • HSE VO • Classroom or HSE VO • Classroom • HSE VO/Classroom • HSE VO • HSE VO • Live Meeting
Energized Electrical Trained Worker (EETW)	Minimum training required by CH2M HILL employees or Contingent Workers who work on or near electric circuit parts or equipment that have not been properly de-energized, locked out, and tagged. Completing the training in this Worker	<ul style="list-style-type: none"> • Enterprise Requirements • Global Harmonized System (GHS) • 2012 NPFA 70E Energized Electrical Safety • Release of Victim (reviewed annually) • First Aid/ CPR required (recertified annually) • Automatic External Defibrillator (AED) as applicable (recertification completed annually) 	<ul style="list-style-type: none"> • HSE VO • HSE VO • Classroom • Classroom • Classroom • Classroom

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
	Category is only one portion of the requirements to be considered an Energized Electrical Qualified Person (EEQP). Refer to HSE-221, Energized Electrical, Section 5.2, Energized Electrical Safety Requirements.		
Enterprise Requirements	Minimum training required by all staff employed directly by CH2M Hill or any of its entities.	<ul style="list-style-type: none"> New Employee Safety Orientation that includes:: <ul style="list-style-type: none"> General Hazard Communication General lifting safety Ergonomics awareness HSE Commitment Statement 	<ul style="list-style-type: none"> HSE VO Classroom or online dependent on training
Facility Operations & Maintenance Worker (FOMW)	FOMW's are employees who could be potentially exposed to hazards (i.e. moving machines parts, toxic gases, live electrical equipment, hot liquids, chemicals, etc.) while performing work activities in an operating facility (i.e. chemical plant, oil/gas/petroleum facilities, paper mill, process facility, etc.). This category also includes Waste Water Treatment Plant (WWTP)	<ul style="list-style-type: none"> Enterprise Requirements General Industry Safety Awareness Global Harmonized System (GHS) Field Awareness Safety Training – FAST (exempt if one-day General Industry trained) Energized Electrical Safety – Refer to EETW Worker Category Note: Only for FOMW performing energized electrical work Business group- or Project-specific training applicable to the type of work performed, such as fall protection, confined space entry, Ladder safety, blood-borne pathogens (for WWTP workers if potentially exposed to raw sewage), etc. Client facility-specific hazard training 	<ul style="list-style-type: none"> HSE VO HSE VO Classroom or HSE VO HSE VO Classroom Classroom or online dependent on training

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
	workers.		
General Office Worker (GOW)	GOWs are CH2M HILL employees or Contingent Workers (contract or temporary) who work in the office environment 100 percent of their time in an administrative or technical position.	<ul style="list-style-type: none"> New Employee Safety Orientation (CH2M HILL US/Puerto Rico or International employees) OR New Contingent Worker Safety Orientation (temporary or contract workers) <p>Both include:</p> <ul style="list-style-type: none"> - General Hazard Communication - General lifting safety - Ergonomics awareness - HS Commitment Statement <ul style="list-style-type: none"> Any country specific training identified by the International Responsible Health and Safety Program Manager. 	<ul style="list-style-type: none"> HSE VO
Hazardous Waste Worker (HWW)	HWWs are employees who work unescorted on project sites where there is a reasonable possibility for hazardous waste to be present, including sites meeting the definition of hazardous waste.	<ul style="list-style-type: none"> Enterprise Requirements Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training, may be 40 or 24-hr course with applicable accompanying OJT HAZWOPER Training (International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager) Annual HAZWOPER Refresher – OSHA 8-hour HAZWOPER Refresher In-house classroom (may attend outside course with approval from the Enterprise HSE Training Manager and BG HSE Lead) International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager) Annual respirator training (may be included in annual Refresher) Global Harmonized System (GHS) Remediation Waste Management Training Business group, International Region, or Project-specific training applicable to the type of work performed, such as fall protection, confined space entry, excavation and trenching, lead awareness, etc. Client facility-specific hazard training Baseline and Periodic Medical Surveillance 	<ul style="list-style-type: none"> HSE VO Vendor Classroom or equivalent for International Regions Classroom Classroom Classroom or HSE VO HSE VO Online or classroom dependent on type of training <ul style="list-style-type: none"> Medical facility

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
Hazardous Waste Worker Limited (HWWL)	This category is for those who only make site visits- no entrance into the exclusion zone, no sampling, no exposure to contaminants. The category fits those who have been with the firm for a few years and have moved into a PM role or no longer do fieldwork. There is no medical monitoring.	<ul style="list-style-type: none"> Enterprise Requirements Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training, may be 40 or 24-Hr course with applicable accompanying OJT HAZWOPER Training (International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager) Annual HAZWOPER Refresher – OSHA 8-hour HAZWOPER Refresher In-house classroom (may attend outside course with approval from the Enterprise HSE Training Manager and BG HSE Lead) International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager) Global Harmonized System (GHS) Business group, International Region or Project-specific training applicable to the type of work performed, such as fall protection, confined space entry, excavation and trenching, lead awareness, etc. Client facility-specific hazard training 	<ul style="list-style-type: none"> HSE VO Vendor Classroom or equivalent for International Regions Classroom Classroom or HSE VO Online or classroom dependent on type of training
Laboratory Worker (LW)	Work in analytical laboratories as their primary job function	<ul style="list-style-type: none"> Enterprise Requirements Laboratory Safety Awareness Laboratory-specific training as required by Business group, Project, or facility-specific hazards Global Harmonized System (GHS) Laboratory Worker Baseline and Exit Medical 	<ul style="list-style-type: none"> HSE VO HSE VO Online or classroom dependent on type of training Classroom or HSE VO Medical facility
Mailroom Staff (MS)	Mailroom Staff are employees who work in the mailroom at a CH2M HILL facility.	<ul style="list-style-type: none"> Enterprise Requirements Dangerous goods Shipping/DOT Battery Recycling Global Harmonized System (GHS) 	<ul style="list-style-type: none"> HSE VO HSE VO HSE VO/Classroom Classroom or HSE VO
Onsite Environmental Manager (OEM)	Staff who serve as the OEM are responsible for overseeing the project environmental compliance	<ul style="list-style-type: none"> Enterprise Requirements Global Harmonized System (GHS) Field Awareness Safety Training Waste Management Training 	<ul style="list-style-type: none"> HSE VO Classroom or HSE VO HSE VO

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
	requirements.	<ul style="list-style-type: none"> • Remediation Waste Training • Dangerous Goods Shipping • Awareness Training: Environmental Program • Awareness Training: Chemical Mgmt at Construction Sites • Awareness Training: Air Compliance • Awareness Training: Petroleum Storage • Awareness Training: Waste Management • Awareness Training: Natural & Cultural Resources • Awareness Training: Construction Site Storm Water Runoff 	<ul style="list-style-type: none"> • HSE VO • HSE VO • HSE VO • HSE VO • HSE VO • HSE VO • HSE VO • HSE VO • HSE VO
Project Manager/Site Supervision (PMSS)	Project manager or person designated as having site supervision responsibilities.	<ul style="list-style-type: none"> • Enterprise Requirements • Project Manager HSE Module 9 Training • Global Harmonized System (GHS) • Initial Safety Coordinator Training • SC-C or SC-HW Training (As needed or when assigned as SC-C or SC-HW) • Business group- or Project-specific training such as one-day or 4-day Construction Safety or General Industry training 	<ul style="list-style-type: none"> • HSE VO • HSE VO • HSE VO • Classroom • Online or Classroom dependent on type of training
Safety Coordinator Categories	Implement HSE program on field projects. Must also meet the requirements of the worker category for the work activities.	See individual Worker Categories below.	

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
Safety Coordinator – Initial (SC)	<i>SCs are workers who implement CH2M HILL safety programs and procedures for non-construction and non-hazardous waste field projects that require FSI; these projects include facility walkthroughs, surveying, sampling, and wetlands field activities. SCs Develop safety plans, oversee subcontractors and third parties, and mitigate common field hazards.</i>	<ul style="list-style-type: none"> Enterprise Requirements Field Awareness Safety Training (Exempt if completed Construction or General Industry Safety Awareness) Initial Safety Coordinator – Refer to Worker Category course requirements Global Harmonized System (GHS) Blood-borne Pathogens Waste Management Training Awareness Training: Environmental Program Dangerous Goods Shipping Fire Extinguisher (Initially and annual refresher required) First Aid, CPR Business group- or Project-specific training applicable to the type of work performed, such as: <ul style="list-style-type: none"> Fall Protection Confined Space Entry Lead Awareness Trenching/excavation Electrical – Lockout/Tagout Ladders and Scaffolding Behavior-Based Safety Loss Prevention 	<ul style="list-style-type: none"> HSE VO HSE VO HSE VO HSE VO HSE VO HSE VO HSE VO/Classroom Classroom Online or classroom dependent on training
Safety Coordinator – Construction (SC-C)	Manage safety for construction projects	<ul style="list-style-type: none"> Enterprise Requirements Initial Safety Coordinator - Refer to Worker Category course requirements Construction Safety Awareness - classroom (e.g. OSHA 10-Hour Construction Awareness) OR 4-day Construction Safety Awareness (e.g. OSHA 30-hour Construction Safety). Both as required by specific US State programs of NV, MA, CT, RH, NH, MO, & NY) Safety Coordinator – Construction Safety Coordinator – Refresher (required to complete 2 modules every 3 years) Global Harmonized System (GHS) Business group- or Project-specific training applicable to the type of work performed, such as: <ul style="list-style-type: none"> Fall Protection Confined Space Entry Lead Awareness 	<ul style="list-style-type: none"> HSE Requirements HSE VO/Classroom Classroom Classroom Net Meeting Online/HSE VO Net Meeting Online or classroom dependent on training

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
		<ul style="list-style-type: none"> - Trenching/excavation - Electrical – Lockout/Tagout - Ladders and Scaffolding - Behavior-Based Safety Loss Prevention 	
Safety Coordinator – Hazardous Waste (SC-HW)	Manage health and safety for hazardous waste projects. Successful completing of the SC-HW course meets the OSHA HAZWOPER training requirement for Management and Supervisor training.	<ul style="list-style-type: none"> • Enterprise Requirements • Initial Hazardous Waste Operations and Emergency Response (HAZWOPER) training, may be 40 or 24-Hr course with applicable accompanying OJT HAZWOPER Training (International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager) • Annual HAZWOPER Refresher – OSHA 8-hour HAZWOPER Refresher In-house classroom (may attend outside course with approval from the Enterprise HSE Training Manager and BG HSE Lead) International Regions may have equivalent training with concurrence with Enterprise HSE Training Manager • Annual respirator training (included in 8-hour Refresher) • Initial Safety Coordinator – Refer to Worker Category course requirements • Global Harmonized System (GHS) • Remediation Waste • Safety Coordinator – Hazardous Waste • Safety Coordinator – Refresher (required to complete 2 modules every 3 years) • Baseline and/or Periodic Medical Surveillance • Business group- or Project-specific training applicable to the type of work performed, such as: <ul style="list-style-type: none"> - Fall Protection - Confined Space Entry - Lead Awareness - Trenching/excavation - Electrical – Lockout/Tagout - Ladders and Scaffolding - Behavior-Based Safety Loss Prevention - Construction Safety Awareness or General Industry Training 	<ul style="list-style-type: none"> • HSE VO • Vendor Classroom • Classroom • Classroom • HSE VO • HSE VO • HSE VO • Classroom • Live Meeting • Medical facility • Online or classroom dependent on training

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
Safety Coordinator – Office (SC-O)	SC-Os are employees trained to perform collateral duty, not typically Health and Safety Professionals, responsible for implementing the Office/Facility HSSE compliance tasks and tracking.	<ul style="list-style-type: none"> Office Safety Coordinator Training Dangerous Goods Shipping Global Harmonized System (GHS) Emergency Responder- Office (ER-O) Training Requirements 	<ul style="list-style-type: none"> Live Meeting HSE VO As described in ER-O requirements
Safety Coordinator – General Industry (SC-GI)	Workers who manage or oversee safety tasks in a general industry or facilities setting.	<ul style="list-style-type: none"> Enterprise Requirements Safety Coordinator –General Industry Training General Industry Safety Awareness (e.g. OSHA 10-hour General Industry Awareness) 4-day General Industry Safety Awareness (e.g. OSHA 30-hour General Industry Awareness training) as required by assignment that can include the following: <ul style="list-style-type: none"> Aerial Lift Asbestos Awareness Confined Space Entry Electrical Safety Fall Protection Fire Extinguisher (Initially and annual refresher required) Ladders Lead Awareness Lockout/Tagout Personal Protective Equipment Forklift Bloodborne Pathogens First Aid/CPR AED (as applicable) Behavior Based – Loss Prevention System Global Harmonized System (GHS) Energized Electrical Safety – Refer to EETW Worker Category Note: Only for FOMW performing energized electrical work Noise/ Hearing Conservation Safety Coordinator – Refresher (required to complete 2 modules every 3 years) Smith Driver Direct On Road Defensive Driving Course 	<ul style="list-style-type: none"> HSE VO Classroom Classroom Classroom Classroom Classroom Classroom Online/HSE VO Online/HSE VO Classroom Online/HSE VO Live Meeting Online/Classroom

Worker Category	Type of Assignment	Core Minimum Training	Training Delivery
		<ul style="list-style-type: none"> • Smith Driving Small Vehicle Backing • Smith Driving Small Vehicle Forward Motion • Traffic Control 	<ul style="list-style-type: none"> • Online/Classroom • Online/Classroom • Online/HSE VO
Site Access Worker (SAW)	SAWs are employees who require access to field project sites or facilities but do not need to be qualified as a hazardous waste worker or construction site worker. This category includes engineers, scientists, and designers who DO NOT work in a hazardous waste or construction area, who do not enter excavations or permit-required confined spaces, and who do not perform any other potentially hazardous activities that require additional safety training (i.e., Electrical safety, ladder safety or fall protection.	<ul style="list-style-type: none"> • Enterprise Requirements • Field Awareness Safety Training (Exempt if completed Construction Safety Awareness training) • Global Harmonized System (GHS) • Business group- or Project-specific training applicable to the type of work performed • Client facility-specific hazard training 	<ul style="list-style-type: none"> • HSE VO • HSE VO • Online or classroom dependent on training

Attachment 3: Frequently Asked Questions about the Safety Coordinator (SC) Role

When is an SC required?

An SC is typically required for field projects that require field safety instructions or HSE plans. SCs are not, as a rule, required for off-the-shelf (OTS) safety plans, but they may be assigned as required by the RHSM. The SC is trained to implement the HSE programs on the site when a full-time HS person is not present at the site. The SC's level of training depends on the project hazards. Project management, along with concurrence from the RHSM identifies personnel who will fulfill the role of the SC, and evaluate their competency prior to putting them in the role of SC.

If only one CH2M HILL employee is assigned to a field project, do they have to be qualified as an SC?

The RHSM will make this decision based on the severity of the potential hazards to which the employee may be exposed while working on the project. The decision will also take into account whether or not the employee must oversee the work of subcontractors.

How many different types of SCs are there?

There are three categories of safety coordinators:

- **Safety Coordinator (SC):** Implement internal safety programs on non-hazardous waste and non-construction projects, including projects where there is just a single CH2M HILL representative onsite. An SC is required even if that person is not responsible for coordinating overall site safety. The SC must know how to develop safety plans, oversee subcontractors and third parties, and mitigate common field hazards such as working from heights, etc.
Safety Coordinator-Construction (SC-C): Manage safety of construction projects, such as construction management and services during construction.
Safety Coordinator-Hazardous Waste (SC-HW): Manage safety on hazardous waste projects.

Employees may be more than one type of SC.

Is an SC a full-time job?

The amount of time it takes to fulfill SC responsibilities depends on the complexity of the project. In certain cases, the SC is a full-time position, but in others, it is a collateral job duty.

Are SCs safety professionals?

SCs are not typically safety professionals. Rather, they are scientists, engineers, planners, etc., who have completed SC training (see below for details on the types of SC training).

What SC courses are there?

There are three courses. All SCs are required to take the initial course. Depending on the type of work being conducted, they may also be required to take one or both of the other courses.

- **Initial SC:** Contains basic safety management information, including SC responsibilities, and processes used to develop project-specific safety plans, manage subcontractors, and implement a written project safety plan. The Initial Safety Coordinator Course is a computer-based module located on the Virtual Office.
- **SC-Hazardous Waste (SC-HW):** Contains information specific to safety management on hazardous waste sites. Topics include air-monitoring instruments (operation and calibration), work zones, decontamination, respirator fit testing, etc. This is an 8-hr class-room course.
- **SC-Construction (SC-C):** Contains information specific to safety management on construction sites. Topics include CH2M HILL's construction Standard Operating Procedures (SOPs); implementation of the field safety instructions (FSI), including self-assessments; and competent person training for ladders and fall protection. The course focuses on safe work practices for CH2M HILL and subcontractor staff. This is a classroom course.
- **SC refresher courses:** Offered by Live Meeting and conference call and cover a variety of topics. SCs may select the topics most relevant to the project assignments. (See below.)

Do SC qualifications expire?

Every SC must complete refresher training every 3 years to remain qualified to act in the SC role. SC Refreshers will be accomplished by attending two (2) refresher sessions in or before the quarter that your training expires. Refresher sessions/topics will be delivered via net meeting/conference call, and each session will be one hour in length with the potential for a written test.

Are SCs required on all projects?

SCs are required on projects where CH2M HILL employees work in the field. The only exception to this requirement may be for projects that fall under an OTS procedure. An SC is required even if there is only one CH2M HILL person onsite and is required regardless of whether CH2M HILL has subcontractors.

If I have off-the-shelf procedures, do I need to be an SC?

The RHSM will make the determination if an SC is required for field projects using an OTS safety plan.

Is an SC required if no CH2M HILL people are in the field?

Yes. An SC is required even though CH2M HILL employees are not in the field because CH2M HILL is providing oversight to the Subcontractors. Subcontractors must have the appropriate HSE training, but they are not required to follow our internal requirements for SC training.

Do all project managers have to take SC training?

Project managers have to take SC training only if they are personally responsible for implementing the HSE program on their project.

Application of SC-C Training

Who has to take the SC-C course?

Anyone who is responsible for implementing CH2M HILL's safety procedures on a construction project. In some cases, the SC-C will oversee CH2M HILL employees and subcontractors, but in many cases, he or she will be the only CH2M HILL representative and there will be no subcontractors onsite. In both cases, we are required to have someone with SC-C training to coordinate and implement the safety programs and procedures.

If I have 10-hour construction training, why do I need to take the SC-C course?

The 10-hour construction course focuses on commonly encountered hazards at construction sites. The SC-C course focuses on how to implement CH2M HILL's HSE program on construction sites, as well as how to manage HSE on such projects. The SC-C course builds on the knowledge gained during the 10-hour construction course.

What is considered a construction project/activity?

Construction projects are defined as any project involving construction, renovation/modification, or demolition of a structure, building, and/or facility.

Do I have to take the SC-C training if I'm the only CH2M HILL person on a construction project and there are no subcontractors?

Yes. The training contains information on how to develop a site-specific safety plan and review procedures on how to interface with onsite third parties, and it covers control measures for common hazards that are found at construction sites. Although some of the same topics are covered in the 10-hour construction course, the emphasis is different.

SC-C Content

What is covered in the SC-C training?

This course covers information specific to safety management on construction sites. Topics include CH2M HILL's construction SOPs; implementation of the FSIs, including self-assessments; and competent person training for ladders and fall protection. The course focuses on safe work practices for CH2M HILL and subcontractor staff.

What will I be responsible for after completing the SC-C training?

You will be responsible for implementing CH2M HILL's HSE program at construction sites.

What is the difference between the one-day construction safety awareness course and the SC-C course?

The one-day construction safety awareness course is required for all staff who works on construction projects. It covers 10 construction-specific topics, providing a basic awareness of the hazards, regulations, and information on the CH2M HILL HSE programs that are applicable to the topics. Staff who is responsible for supervising HSE at construction projects must also take the SC-C training, which focuses more on HSE management issues, such as third-party management and assessments. Although some of the same topics are covered in the 10-hour construction course, the emphasis in the SC-C is different.

What training do I need to have to be an SC-C?

You are required to successfully complete the one-day construction safety awareness course, the Initial SC Course, the SC-C Course, New Employee Safety Orientation (including Hazard Communication), Dangerous Goods Shipping/DOT, Waste Management, First Aid and CPR, AED (as applicable), Fire Extinguisher, Environmental Awareness and Blood-borne Pathogens, including an annual refresher. In addition, you may be required to complete training that is country specific or specific to the project you are working on (e.g., Confined Space Entry).

Logistics of SC-C Training

How do I get SC-C training?

You can register for SC-C training using the on-line HSE Training Calendar on the HSE webpage on the Virtual Office. If you have trouble with the website, contact your SPA or designated training coordinator to assist you in enrolling in the course.

When and where is the SC-C training held?

See the on-line HSE Training Calendar or call your SPA for times and locations of courses.



HSE Training

Standard Operating Procedure HSE-110

Attachment 4: Request for Extension of Qualification

DATE:

TO: (HSE Training Manager and Responsible Health and Safety Manager), FILE (SPA)

FROM: (Project Manager, Operations Leader, etc.)

SUBJECT: **Request for Extension of Qualification** for (Name & Global Employee Number)

Extensions on qualification/certification may be granted on a case-by-case basis in order to support operational commitments. Requests for extension must contain the length of the extension, and the Compensatory actions, if necessary.

Course (8 HR Refresher, etc.): _____

Course expiration date: _____

Date of Refresher Course _____

Explanation of the circumstances that prevented the person from completing the requirements:

Approved extension requests will be noted in the employee's electronic training file.

Concur/Date: _____
CH2M HILL HSE Training Manager
Manager

Concur/Date: _____
Responsible Health and Safety

Concur/Date: _____
Project Manager

Project Number: _____

Cc: Candidate



HSE Training

Standard Operating Procedure HSE-110

Attachment 5: Request for Credit for HSE Experience

DATE:

TO: (HSE Training Manager and Responsible Health and Safety Manager), FILE (SPA)

FROM: (Project Manager, Operations Leader, etc.)

SUBJECT: **Request for Credit for HSE Experience** for (Name & Global Employee Number)

A request for credit for training may be granted based on previous training, education, and/or experience must demonstrate the knowledge and skills addressed by the course for which they request credit. The request for credit must include documentation of the basis of the exception.

1. Provide sufficient evidence of previous training, education and/or experience to indicate proficiency with the training objectives, or
2. Is a training staff member with primary administrative responsibility for the training subject? For example, an employee who prepares, administers and grades a written examination need not take the examination, or
3. Is the Subject Matter Expert for the course subject or examination?

Course Credit Requested (40 HR Hazwoper, etc.): _____

Explanation (include documentation):

Approved requests, along with the documentation, will be noted in the employee's electronic training file.

Concur/Date: _____
CH2M HILL HSE Training Manager
Manager

Concur/Date: _____
Responsible Health and Safety

Concur/Date: _____
Project Manager

Project Number: _____

Cc: Candidate



HSE Training

Standard Operating Procedure HSE-110

Attachment 6: HAZWOPER – On the Job Training (OJT) Form

Record of Supervised Field Experience per the HAZWOPER Regulation

This form is to certify that the employee listed below has completed an equivalent of one- or 3-days of supervised field experience, meeting the training requirement described in OSHA standard, Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120 (e)(3)(i) or (ii).

Documented field experience must be under the direct supervision of a trained, experienced supervisor after an employee has completed OSHA 40-hr or 24-hr HAZWOPER training.

Employee Name: _____ Employee GEN: _____

Worker Category: _____ Date: _____

Check the appropriate training category and insert the information requested below.

- ☐ 3-day OJT – General site worker (40-hr HAZWOPER)
- ☐ 1-day OJT – Occasional site worker (24-hr HAZWOPER)

List general date(s), description of field work conducted, general type(s) of contamination, and levels of personal protective equipment worn during prior supervised HAZWOPER field work.

Employee Signature verifying dates and descriptions of work:

Name and Signature of Supervisor certifying equivalent training:

Please return this completed form to your Safety Program Assistant (SPA).



HSE Training

Standard Operating Procedure HSE-110

Attachment 7: OSHA 10 and 30-hour Construction Safety Guidelines

OSHA 10-Hour Construction Safety

OSHA 10-Hour Construction Safety training sets the cornerstone for the safe, healthy and productive workplace. This compliance library of training courses is specifically designed to provide employees the knowledge they need to work smart and utilize best safety practices to protect themselves, those who work around and with them, their work site and the environment. This worksheet is to plan the OSHA 10 Hour Construction Safety training to meet the BG specific construction safety training needs.

As of October 2010, it is mandated that course length not exceed a maximum of 7 hours of training in one day and the 10 hr courses be delivered over a minimum of 2 days. OSHA Construction Safety Certified Trainers not meeting these requirements will not receive student completion cards.

The minimum topic requirements are as follows:

Required: 7 Hours	Electives: 2 Hours
<u>2 Hours: Intro to OSHA</u>	<u>Must cover at least 2 topics:</u> <ul style="list-style-type: none"> • Cranes, Derricks, Hoists, Elevators, and Conveyors • Excavations • Materials Handling, Storage, Use, and Disposal • Scaffolds • Stairways and Ladders • Tools: Hand and Power
<u>4 Hours: Focus Four:</u> <ul style="list-style-type: none"> • Fall Protection: 1 Hour 15 Minute Minimum • Electrocutation: 30 Minute Minimum • Struck By: 30 Minute Minimum • Caught In/Between: 30 Minute Minimum <p>Please note that the MINIMUM time requirements for each section of Focus Four equals 2 hours and 45 minutes, additional time must be added for the total amount of time spent of Focus Four to equal FOUR HOURS.</p>	
<u>30 Minutes: Personal Protective and Lifesaving Equipment</u>	<u>Optional:</u> 1 hour. Teach other construction industry hazards or policies and/or expand on the mandatory or elective topics. The minimum length of any topic is one-half hour.
<u>30 Minutes: Health Hazards in Construction</u>	

OSHA 30-Hour Construction Safety

The OSHA 30-Hour Construction Safety course is intended to provide a variety of training topics to employees who are assigned some safety responsibility or capacity as a supervisory on a construction site. These employees must receive additional training on hazards specific to their responsibilities and tasks. Training should emphasize hazard identification, avoidance, control and prevention, not OSHA standards. Instructional time must be a minimum of 30 hours. OSHA subpart references are provided for informational purposes; training should emphasize hazard awareness. Use this worksheet to plan your OSHA 30 Hour Construction Safety training to meet your specific safety needs.

As of October 2010, it is mandated that course length not exceed a maximum of 7 hours of training in one day and the 30 hr courses be delivered over a minimum of 4 days. OSHA Construction Safety Certified Trainers not meeting these requirements will not receive student completion cards.

The minimum topic requirements are as follows:

Required: 15 Hours
<u>2 Hours: Intro to OSHA</u>
<u>2 Hours: Managing Safety and Health</u> May include Injury and Illness Prevention Programs, job site inspections, accident prevention programs, management commitment and employee involvement, worksite analysis, hazard prevention and control, accident investigations, how to conduct safety meetings, and supervisory communication.
<u>6 hours: Focus Four:</u> <ul style="list-style-type: none">• Fall Protection: 1 Hour 15 Minute Minimum• Electrocuting: 30 Minute Minimum• Struck By: 30 Minute Minimum• Caught In/Between: 30 Minute Minimum Please note that the MINIMUM time requirements for each section of Focus Four equals 2 hours and 45 minutes, additional time must be added for the total amount of time spent of Focus Four to equal SIX HOURS. Trainer may spend up to ten hours on Focus Four.
<u>2 Hours: Personal Protective and Lifesaving Equipment</u>
<u>2 Hours: Health Hazards in Construction</u>
<u>1 Hour: Stairways and Ladders</u>

Electives: 12 Hours
<u>Must cover at least 6 topics:</u> <ul style="list-style-type: none">• Concrete and Masonry Construction• Confined Space Entry• Cranes, Derricks, Hoists, Elevators, and Conveyors• Ergonomics• Excavations• Fire Protection and Prevention• Materials Handling, Storage, Use, and Disposal• Motor Vehicles, Mechanized Equipment and Marine Operations; Rollover Protective Structures and Overhead Protection; and Signs, Signals and Barricades• Powered Industrial Vehicles• Safety and Health Programs• Scaffolds• Steel Erection• Tools - Hand and Power• Welding and Cutting
<u>Optional:</u> 3 hours. Teach other construction industry hazards or policies and/or expand on the mandatory or elective topics. The minimum length of any topic is one-half hour.



HSE Training

Standard Operating Procedure HSE-110

Attachment 8: OSHA 10 and 30-hour General Industry Guidelines

OSHA 10-Hour General Industry - Designated Training Topics

This training program is intended to provide entry level general industry workers with Information about their rights, employer responsibilities, and how to file a complaint, as well as how to identify, abate, avoid and prevent job related hazards on a job site. The training covers a variety of general industry safety and health hazards which an Employee may encounter. Training should emphasize hazard identification, avoidance, control and prevention, not OSHA standards. Learning objectives on some of these topics are on the CD which is distributed in all OSHA General Industry trainer classes, and available for download at the Outreach Training Program website (www.osha.gov/dte/index.html). Instructional time must be a minimum of 10 hours.

As of October 2010, it is mandated that course length not exceed a maximum of 7 hours of training in one day and the 10 hr courses be delivered over a minimum of 2 days. OSHA General Industry Safety Certified Trainers not meeting these requirements will not receive student completion cards.

The minimum topic requirements are as follows:

Required: 7 Hours	Elective: 2 Hours
<u>2 Hours: Intro to OSHA</u>	<p><u>Must present at least two hours</u> of training on the following topics. At least two topics must be presented. The minimum length of any topic is one-half hour.</p> <ul style="list-style-type: none"> • Hazardous Materials • Materials Handling • Machine Guarding • Introduction to Industrial Hygiene • Bloodborne Pathogens • Ergonomics • Safety and Health Program • Fall Protection
<u>1 Hour: Walking and Working Surfaces, including fall protection</u>	
<u>1 Hour: Exit Routes, Emergency Action Plans, Fire Prevention Plans, and Fire Protection</u>	<u>Optional: 1 Hour.</u> Teach other general industry hazards or policies and/or expand on the mandatory or elective topics. The minimum length of any topic is one-half hour.
<u>1 Hour: Electrical</u>	
<u>1 Hour: Personal Protective Equipment</u>	
<u>1 Hour: Hazard Communication</u>	

OSHA 30-Hour General Industry Outreach Training Program - Designated Training Topics

The 30-hour General Industry Outreach Training Program is intended to provide a variety of training to workers with some safety responsibility. Training should emphasize hazard identification, avoidance, control and prevention, not OSHA standards. Instructional time must be a minimum of 30 hours.

As of October 2010, it is mandated that course length not exceed a maximum of 7 hours of training in one day and the 30 hr courses be delivered over a minimum of 4 days. OSHA General Industry Safety Certified Trainers not meeting these requirements will not receive student completion cards.

The topic requirements are as follows:

Required: 13 Hours

2 Hours: Intro to OSHA

2 hours: Managing Safety and Health. May include Injury and Illness Prevention Programs, job site inspections, accident prevention programs, management commitment and employee involvement, worksite analysis, hazard prevention and control, accident investigations, how to conduct safety meetings, and supervisory communication.

1 Hour: Walking and Working Surfaces, including fall protection

2 Hours: Exit Routes, Emergency Action Plans, Fire Prevention Plans, and Fire Protection

2 Hours: Electrical

1 Hour: Personal Protective Equipment

2 Hours: Materials Handling

1 Hour: Hazard Communication

Electives: 10 Hours

Must present at least 10 hours of training on the following topics. At least 5 of the following topics must be presented. The minimum length of any topic is one-half hour.

- Hazardous Materials (Flammable and Combustible Liquids, Spray
- Finishing, Compressed Gases, Dipping and Coating Operations)
- Permit-Required Confined Spaces
- Lockout / Tagout
- Machine Guarding
- Welding, Cutting, and Brazing
- Introduction to Industrial Hygiene
- Bloodborne Pathogens
- Ergonomics
- Fall Protection
- Safety and Health Programs
- Powered Industrial Vehicles

Optional: 7 Hours. Teach other general industry hazards or policies and/or expand on the mandatory or elective topics. The minimum length of any topic is one-half hour.



[Click here for attachments](#)

Incident Notification, Reporting and Investigation Enterprise Standard Operating Procedure HSE-111

1.0 Purpose

The purpose of this Enterprise-wide Standard Operating Procedure (SOP) is to provide direction on required process for incident notification, reporting and investigation to CH2M HILL leadership, project managers, supervisors, Health, Safety, Security, Environment (HSSE), Human Resources (HR), and Legal and Insurance Department (LID).

2.0 Scope and Application

This SOP describes the procedures for internal notification, reporting and investigation of all incidents and serious incidents. This SOP must be followed by all CH2M HILL legal entities and Business Groups (BGs), their employees, subcontractors, and their lower-tier subcontractors that operate in the United States (U.S.) and internationally.

CH2M HILL established one reporting process integrating health and safety, security, and environmental requirements for the consistent notification of and management of incidents and serious incidents throughout our operations.

2.1 Applicable Enterprise SOPs

Other applicable Enterprise SOPs include:

- [HSE-106, Emergency Planning](#)
- [HSE-124, Injury Management/Return to Work](#)

3.0 Definitions

Employee

The term “employee” includes all CH2M HILL full-time, part-time, and temporary-duty employees, as well as contracted employment agency and temporary employees for which CH2M HILL is responsible for day-to-day direction. “Employee” does not include subcontractor employees who are supervised by subcontractor management.

Emergency

A sudden unforeseen event requiring immediate response and action to protect people, property, or the environment.

Hours and Incident Tracking System (HITS)

The Hours and Incident Tracking System (HITS) is the Enterprise HSE database designed to create incident reports, capture employee hours worked from Expense and Time System (ETS), capture

employee and subcontractor hours worked on projects, and generate safety performance reports and Occupational Safety and Health Administration (OSHA) 300 logs and 300A summary reports.

Work-Related Injury or Illness

Work-related injury or illness includes all injuries and illnesses that result from an event or exposure in the work environment. “Work environment” includes CH2M HILL premises and other locations where employees are engaged in work-related activities or are present as a condition of employment.

Some countries have a more liberal definition of work relatedness, please follow local statutory requirements outside the United States.

Incident

An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public
- Property damage
- Spill or release
- Environmental requirement or permit violation
- A “near-miss”
- Other (e.g., fire, explosion, bomb threat, workplace violence, threats)

Investigation

An investigation is the systematic and objective examination of facts to identify the immediate and basic causes of an incident, and to determine the appropriate corrective actions to prevent recurrence. The immediate causes are the circumstances that precede the incident such as substandard conditions or behaviors. The basic causes are the underlying reasons why the incident occurred such as personal factors or system factors.

Near-Miss

A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation or other event from occurring. Examples of near-miss situations include: a hard hat or other personal protective equipment (PPE) prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert co-worker prevented an incident.

Serious Incident

A Serious Incident must be immediately reported to senior management includes:

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage.

- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

4.0 Roles and Responsibilities

4.1 Employee

The employee is responsible for:

- Notifying immediately their Supervisor and Emergency Response Coordinator (ERC) of all incidents, including serious incidents.
- Providing specific information related to incidents they experienced or witnessed to their Supervisor, Project Manager, Business Group Environmental Manager (BG EM), or Responsible Health and Safety Manager (RHSM) to assist with completing the CH2M HILL online Hours and Incidents Tracking System (HITS) incident report.
- For employees in the United States and Puerto Rico (except E&C Alaska), contacting their Supervisor when they have experienced a work-related injury or illness and calling the Injury Management/Return-to-Work toll-free number.

4.2 Supervisor

The Supervisor is responsible for:

- Providing verbal notification, involving their employees, to their organizational management (e.g. Business Group or Region) of all incidents, including serious incidents.
- Completing and submitting the incident report in HITS for employees under their supervision who have experienced an incident, especially a work-related injury/illness.
- Providing additional or updated information about the incident to the RHSM, BG EM, or Security Manager after the initial incident report has been submitted.
- Conducting or participating in incident investigations as requested by their organizational management and HSE.
- Notifying Human Resources of a work-related injury or illness so that appropriate workers compensation documentation may be prepared.

4.3 Emergency Response Coordinator (ERC)

The ERC is designated in the office or project emergency response plan. At project sites the ERC might also be called a Site Safety Coordinator. The ERC is responsible for:

- Implementing emergency response procedures as directed in the emergency response plan for all emergencies (see HSE-106, *Emergency Planning*).
- Providing verbal notification of all incidents and serious incidents as described in Section 5.2 and 5.3 of this SOP.
- Calling the Crisis Management line (720-286-4911) for a serious incident meeting the criteria defined in section 3.0 of this SOP.

- Contacting the BG EM and RHSM in the event of a spill or release to the environment so the BG EM can evaluate the reportable quantity requirements and determine whether government reporting is required.
- Creating and submitting an incident report in HITS for all non-injury incidents.
- Creating and submitting an incident report in HITS for a work-related injury/illness or security or environmental incident involving a CH2M HILL subcontractor.
- Providing additional or updated information about the incident and participating in incident investigations as requested by their organizational management.

4.4 Project Manager (PM)

Project Managers are responsible for:

- Designating an ERC for all field or construction projects.
- Reporting all incidents and serious incidents through the process described in 5.2 and 5.3 of this SOP.
- Calling the Crisis Management line (720-286-4911) for a serious incident meeting the criteria defined in section 3.0 of this SOP.
- Reporting incidents to the client, when necessary, based on review and concurrence with the LID, RHSM or BG EM.
- Initiating and participating in the incident investigation process as directed by their organizational management.
- Ensuring the project incident investigation is completed, reviewed with appropriate staff, and corrective actions are implemented.

4.5 Office Manager

Office Managers are responsible for:

- Reporting all incidents and serious incidents occurring in CH2M HILL offices through the process described in 5.2 and 5.3 of this SOP.
- Calling the Crisis Management line (720-286-4911) for a serious incident meeting the criteria defined in section 3.0 of this SOP.
- Reporting incidents to the building owner, when necessary, based on review and concurrence from Facilities and Operations, LID, RHSM or BG EM.
- Initiating and participating in the incident investigation process as directed by their organizational management, RHSM, BG EM, LID, HRR, or Security Manager.
- Ensuring the incident investigation is completed, reviewed with appropriate staff, and corrective actions are implemented in their office.

4.6 Responsible Health and Safety Manager (RHSM)

The responsible Health and Safety Manager (RHSM), for the Region or Business Group, is responsible for:

- Being available (or appointing a designee, if unavailable) to receive notification of all incidents.

- Providing verbal notification of all incidents and serious incidents as described in Section 5.2 and 5.3 of this SOP.
- Reviewing submitted Injury/Illness, Property Damage, Near-Miss, and Other incident reports in HITS for completeness and accuracy and completing the applicable Evaluation sections of HITS.
- Updating the Evaluation sections in HITS when additional or updated information becomes available.
- Appointing Health and Safety Leads or other project staff for review and evaluation of incident reports.
- Initiating and participating in the incident investigations for Injury/Illness, Property Damage, Near-Miss, and Vehicle incidents with the applicable organizational management, BG HS Lead, BG EM, and LID.
- Determining when a Root Cause Analysis (RCA) is required and ensuring it is completed and results entered in the incident report form in HITS.

4.7 Business Group Health and Safety Lead (BG HS Lead)

The BG HS Lead is responsible for:

- Providing training on this SOP and the HITS system to BG employees.
- Designating RHSMs within their BG for evaluating, reviewing, investigating (including coordinating root cause analysis) incidents.
- Reviewing and evaluating Injury/Illness reports in HITS to verify that reports are being completed in a consistent manner and in compliance with Occupational Safety and Health Administration (OSHA) recordkeeping requirements.
- Peer review of Root Cause Analysis depending on the type and circumstances associated with the incident
- Designating injury/illness report status in HITS to “closed” when it is appropriate to do so. This responsibility may be delegated to RHSM, but the BG HS Lead retains final responsibility for when a HITS injury/illness is closed.

4.8 Business Group Environmental Manager (BG EM)

The BG EM is responsible for:

- Providing incident verbal notification described in 5.2 and 5.3 of this SOP.
- Analyzing environmental incidents for criticality and reportability. This includes calculating whether spilled or released materials exceeded a permit condition or a reportable quantity according to environmental requirements.
- Contacting the appropriate environmental agency when a reportable release occurs or documenting the discussions with our client recommending that they notify the regulatory agency.
- Reviewing and updating submitted Spill/Release and Environmental/Permit Issues in HITS for completeness, consistency, and accuracy and in compliance with applicable federal, state, and local environmental requirements.

- Completing the Environmental Manager's Analysis section of the incident report in HITS.
- Advising PMs on incident investigations and cleanup protocols for Spill/Release and Environmental/Permit Issue incidents. Assisting with spill cleanup material transport and disposal arrangements as needed.
- Determining when a Root Cause Analysis (RCA) for environmental incidents is required and ensuring it is completed and results entered in the incident report form in HITS.
- Designating an environmental incident report status in HITS to "closed" when it is appropriate to do so.

4.9 Legal and Insurance Department (LID)

The LID is responsible for:

- Directing internal and external communication, reporting, and investigation of serious incidents.
- Assigning worker compensation case management.
- Granting approval for communication with external parties regarding incidents.
- Addressing liability and insurance issues associated with the incident.

4.10 Human Resources Representative (HRR)

The HRR is responsible for:

- Completing and submitting necessary worker compensation reports and forms.
- Coordinating with LID on worker compensation issues.

4.11 Enterprise Health, Safety, Security, and Environment (HSSE)

The Enterprise HSSE organization is responsible for:

- Maintaining the HITS database of all incidents and investigations.
- Reviewing HITS monthly to ensure compliance with OSHA recordkeeping requirements and environmental reporting requirements.
- Distributing summaries with analysis of incidents with periodic management reports.
- Revising HSSE programs as necessary to prevent future incidents.
- Conducting serious incident investigations with BG staff and reporting findings to the CH2M HILL Operations Council.

4.12 Business Group Target Zero Leadership Team (TZLT)

Each BG TZLT is responsible for:

- Reviewing applicable incidents that have impacts on BG operations and developing and implementing corrective actions and lessons learned.
- Assembling a BG crisis management team to respond to BG related serious incidents.

4.13 CH2M HILL Security

The CH2M HILL Security Chief Security Officer or designee is responsible for:

- Acting in the capacity as Enterprise Crisis Manager.
- Providing on-call notification for serious incidents.
- Completing an incident report in HITS for security related incidents and providing additional or updated information to appropriate organizational management.
- Completing the Security Evaluation section in HITS.
- Initiating and conducting security related incident investigations as requested by their organizational management, LID, or HRR.

4.14 Crisis Management Support Team (CMST)

The Crisis Management Support Team is comprised of key corporate staff in Finance and Accounting, Human Resources, Legal and Insurance, Risk Management, Communications, Information Technology, the BG President, and applicable Operations Council members or the Governance Council as necessary who are responsible for:

- Providing support to the Local Crisis Management Team for guidance and augmentation of staff resources to complete the investigation and resolution of the serious incident.

4.15 Local Crisis Management Team (LCMT)

The Local Crisis Management Team (LCMT) is comprised of key staff within the Geographic Region or BG to manage serious incidents on-scene either at a facility, project, or project field-site that are responsible for:

- Identifying appropriate management representatives as team leader and temporary spokesperson for interaction with emergency response, law enforcement, regulatory agencies, media, and general public.
- Coordinating incident investigation, recovery and communications with key corporate staff or Crisis Management Support Team.
- Gathering all incident related information including site conditions, equipment and persons involved, actions leading to and after incident, witness statements, photographs, written and verbal statements from emergency response, law enforcement, regulatory agencies or media.
- Completing an incident investigation with HSSE staff or members of the Crisis Management Support Team.

5.0 Requirements

5.1 Emergency Response

Procedures for the immediate reporting of emergencies must be included in the ERP as described in SOP HSE-106 *Emergency Planning*. All incidents must immediately be reported to the ERC. If required, the ERC must immediately report emergency situations to the appropriate response authorities as indicated in the ERP.

5.2 Incident Verbal Notification

The following notification procedures apply to all incidents, including after an Emergency Response Plan (and HSE-106, *Emergency Planning*) has been implemented for emergencies.

Incidents must be **verbally** communicated immediately after the incident occurs, as shown in Attachment 1, CH2M HILL Immediate Incident Notification Flowchart. Spills and releases, in particular, must be reported without delay because “immediately” has been interpreted in many jurisdictions to mean within 15 minutes.

Incident notification, except serious incidents, must occur as follows:

- For all incidents, employees and subcontractors must immediately notify the ERC specified in the project plan and their direct supervisor (e.g., Project Manager or Group Leader). Verbal notification must include the following information:
 1. Reporting person’s name and contact number (preferably a cell phone number)
 2. Facility or project
 3. Date/Time of incident
 4. Location of incident (City, State, Country)
 5. Type of incident (injury/illness, property damage, spill/release, environmental/permit exceedance)
 6. A description of the incident, persons involved, family contact information and other information readily available
 7. Description of immediate and/or short-term corrective actions
- For all work-related injuries and illnesses in the United States and Puerto Rico (except E&C Alaska), employees must contact their supervisor and then call the Injury Management/Return-to-Work Administrator (866-893-2514) and provide all requested information. The employee’s Supervisor must follow procedures in HSE-124, Injury Management/Return to Work.
- For all work-related injuries and illnesses in Canada, when a medical emergency, call 911 and make appropriate notifications to supervisor, RHSM, and HR Representative. If it is not a medical emergency, the supervisor and HR must be notified. HR will initiate the necessary paperwork and if necessary, the employee should follow-up with their physician.
- For all work-related injuries and illness internationally, employees, supervisors, and HR should follow country and regional guidelines for medical and non medical emergencies.
- For all work-related injuries and illnesses, supervisors must contact HR so that appropriate worker compensation documentation may be prepared.
- The employee, ERC or direct supervisor must notify the Project/Facility Manager and RHSM of all incidents, who notifies the client and building owner of the incident, if necessary.
- The ERC or Project/Facility Manager must notify the Crisis Manager (720-286-4911) of all serious incidents. The ERC and Project/Facility Manager and Crisis Manager must follow procedures in Section 5.3, Serious Incidents.
- The ERC must notify the BG EM and RHSM spills/releases and environmental/permit incidents.
- The BG EM will determine government reporting requirements and notify the PM (who will notify the client), and/or appropriate authorities of reportable incidents. Refer to Attachment 3, Agency Reporting for Environmental Spills, for more information about reporting requirements. The BG EM and the actual regulations (federal, state and local) must be consulted in the event of a spill or release.

5.3 Serious Incidents

Serious incident events must be **verbally** communicated immediately (within 2 hours) after the incident occurs, as shown in Attachment 2 Serious Incident Reporting Flowchart. Serious Incident event notification must occur as follows:

- Following notification from the ERC or the Project/Facility Manager, the Crisis Manager must provide immediate verbal notification to:
 - The Crisis Management Support Team
 - Enterprise Chief HSSE Officer or designee(s)
 - Business Group Legal Representative
 - Business Group Presidents
- BG Presidents and/or Operating Division Presidents must provide immediate verbal notification to the Operations Council.
- The Crisis Manager will confer with the Business Group Presidents, and/or Project Managers to determine whether a Local Crisis Management Team will be assembled to manage the crisis. Members of the Crisis Management Support Team will be activated as necessary to support the Local Crisis Management Team.
- The Chief HSSE Officer and LID will provide oversight and regulatory support to the Business Group President and Crisis Management Support Team.

5.4 Incident Reporting Process

The CH2M HILL incident report is an online form in the Hours and Incident Tracking System (HITS) for reporting, tracking and trending all CH2M HILL and subcontractor incidents. This section describes the procedures for completing, reviewing and evaluating the online incident report.

The Enterprise HSE organization will maintain the HITS database of all submitted incidents. There are two phases to the reporting process: the initial incident entry and the incident evaluation.

- **Phase I – Incident Entry.** Facts regarding the incident are collected and saved to the HITS database. For those that do not have direct access to the online form, print and complete the hard copy form in Attachment 5 and forward to your RHSM for input in the online HITS database.

Once the incident is submitted, emails are sent to appropriate business group HSE staff notifying them that an incident report has been completed. The email contains a hyperlink that directs the user to the specific incident number where it can be reviewed, updated and evaluated.

- **Phase II – Evaluation of the Incident.** RHSMs, BG HS Leads, and BG EMs evaluate the incident to determine recordability/reportability requirements. Attachment 3 provides additional information on environmental incident reporting. The Evaluation section also includes fields for commenting on root causes and contributing factors, as well as corrective actions to be taken to prevent recurrence of a similar event.

HSE staff can also query the HITS database to perform trend analysis and generate safety and environmental performance reports and logs.

5.4.1 Incident Report Form Completion

The Incident Report in HIT, Phase I – Incident Entry, must be completed within 24 hours of the incident. Responsibilities for initial creation are shown in Attachments 1, Incident Notification Flowchart, and Attachment 2, Serious Incident Reporting Flowchart. Refer to the HITS web page for specific guidelines for accessing and completing the incident report.

Guidelines for completing an incident report are as follows:

- For serious incidents, the HITS incident report is completed only as directed by the Corporate Legal Department.
- The employee's supervisor is responsible for completing the incident report for incidents where injuries to CH2M HILL employees are involved.
- The ERC or their designee is responsible for completing the incident report for all other incidents including property damage, spills/releases, environmental/permit issues, near-misses, and injuries to subcontractors.
- Any problems encountered with the HITS software should be referred to CH2M HILL Technical Assistance Center.

5.4.2 Incident Report Evaluation

When an incident is submitted, a report is automatically generated and distributed to designated HSE staff for their review and evaluation. The evaluations sections only become available after Phase I have been submitted. Refer to the specific guidelines for evaluating the incident in the HITS online Help section.

Access to the Evaluation sections is limited through HITS security. RHSMs, BG HS Leads and BG EMs are responsible for reviewing incident reports for accuracy and completeness, but can grant access to Project Managers and designated reviewers to allow them to evaluate and modify the entry and evaluation sections.

Incident reports submitted for environmental spills or releases will be reviewed by HSE Environmental staff when submitted in HITS for potential agency notification requirements (see Attachment 3).

The incident reports submitted for injury/illness will be reviewed monthly by the Enterprise HSE staff for accuracy, completeness, and consistency with OSHA recordkeeping requirements. If a report is found to be questionable for determination of OSHA recordability and/or recordkeeping, the BG HS Lead will be notified to provide further information or justification. The information will be reviewed by Enterprise HSE staff to reconcile the discrepancy in OSHA recordability and/or recordkeeping. The Chief HSSE Officer will issue a final determination in situations where agreement cannot be reached by the BG HS Lead and the Enterprise HSE staff. The evaluation sections and responsibility for completion is as follows:

Illness/Injury Section: This section is completed to determine whether the incident is a recordable injury or illness following OSHA record keeping guidelines. This determination must initially be completed within seven calendar days. The Business Group HS Lead or designee(s) (RHSMs or project reviewers) completes this section. Internationally, the RHSM also determines whether the incident is recordable according to local statutory requirements.

Environmental Evaluation Section This section is included for Environmental/Permit and Spill/Release incidents and are completed by BG EMs to determine whether the incident is a

reportable spill or violation. Include the reportable quantity (RQ) amount and calculations to determine if a spill exceeds the RQ and is reportable.

HSE Evaluation: This section is included for all incident types. The BG HS Lead or designee(s) (RHSMs, BG EM, or project reviewers) completes this section with information and assistance provided by LID representatives as needed.

Security Evaluation Section: This section is completed by HSSE staff or a Security representative, as appropriate.

5.4.3 Incident Report Modification

When additional or updated information becomes available regarding an existing incident this information must be communicated to the RHSM so that the report can be updated in HITS. Once modified, an email with the HITS number and link will be routed and reviewed following the same process as described in section 5.4.2, Incident Report Evaluation. Weekly updates will automatically be sent to the BG HS Leads until all the incident information is obtained, entered into HITS as complete, and is submitted as “closed.” The BG HS Lead or BG EM (for environmental incidents) is responsible for changing the Incident Report Status to “closed” once all fields have been completed.

5.4.4 Incident Statistics

The online HITS is used to monitor HSE performance. Queries can be run relative to the total hours worked on project sites, by business group, incident type or date. Incident report results are compiled, evaluated, tracked, resolved, and incorporated into ongoing HSE program improvement activities by HSE staff. This information is regularly communicated to staff members and upper management in periodic performance reports and articles about lessons learned. The HSE Performance Metrics representative can design and run queries in HITS upon request.

5.4.5 OSHA Reports

The online HITS is also used to record, track, and produce OSHA injury illness reports. This includes OSHA 300 logs and 300A summary reports by project or office location. Annually, 300A summaries are prepared by the Enterprise HSE Performance/Metrics Manager and signed by HSE Operations Director after reviewing to ensure they are correct and complete. The OSHA 300 A summaries are then posted from February 1 to April 30 in a place visible to employees within project and office locations.

5.5 Incident Investigation

The purpose of an incident investigation is to determine how the incident happened, identify the root causes, and prevent recurrence by implementing corrective actions and distributing lessons learned. Incident investigations are to be initiated and completed as soon as possible, but no later than 72 hours after the incident has occurred. To conduct an effective investigation, all information must be as detailed and comprehensive as possible.

Guidelines for conducting an incident investigation are described in Attachment 4.

- The investigation must be based on facts that clearly identify the sequence of events and the factors that contributed to the incident to determine the immediate and basic causes.
- Serious incident events are investigated as directed by the Legal and Insurance Department. An investigation team will be organized by the BG President and BG HS Lead. For HSE incidents,

the Chief HSSE Officer will conduct or designate HSE staff to investigate serious incidents involving life threatening or fatal injuries, significant spills or releases of hazardous materials, or property damage. The Chief Security Officer will conduct or designate staff to investigate security-related serious incidents involving kidnap/missing person, acts or threats of terrorism, or property damage.

- An incident investigation team will be assembled based on the type and seriousness of the incident. Except for serious incidents, the RHSM or BGEM (depending on the type of incident) will be responsible for initiating and determining the level of the investigation. The RHSM/BGEM may conduct the investigation directly, assemble an investigation team, or may delegate this function to the ERC, depending on the extent of the incident and staff availability.
- Root Cause Analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of \$5000.00(US), environmental permit violations, spills and releases which are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/REM is responsible for ensuring it is completed and results entered in the incident report form in HITS. An RCA must be completed using the process or equivalent described in Attachment 4, using a Team that includes, at least the RHSM or designee, the involved party(ies), a responsible operations representative (e.g. PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.
- The RHSM/BG EM must ensure that the Project Manager (client sites) or Office Manager (CH2M HILL offices) is made aware of investigation findings and all corrective actions, and verify that corrective actions are implemented to prevent recurrence. The PM and OM is responsible for their project and office respectively for ensuring the incident investigation is completed, reviewed with appropriate staff, and corrective actions are implemented.
- A supplemental report may be required for more extensive investigations. Corrective actions are based on determining the appropriate improvement or development of management programs to prevent recurrence.
- Investigation information, including the results of the RCA, is inputted into the applicable evaluation sections in HITS such as the immediate causes, root causes, and corrective actions. The HITS should be closed by the RHSM/BGEM) when corrective actions are verified as completed. Non-crisis investigations will be documented by updating the HITS incident report and describing the investigation facts in the Evaluation sections.
- Lessons learned or written articles may be developed by HSE staff based upon the investigation findings that reveal new, unusual, or idiosyncratic causes that others may benefit from.

6.0 Training Requirements

Guidelines for completing and submitting the incident reports are available on the HITS home page under the Help tab. The HITS database can be accessed from the Virtual Office under the HSE website. Group or individual assistance with using HITS will be provided based on need by the Enterprise HSE Performance Metrics representative.

Recommended learning on incident reporting and investigations is to complete the Practical Loss Control Leadership course.

7.0 Recordkeeping

Electronic versions of incidents are maintained in the HITS database. All investigation reports will be maintained with the applicable office, region, theatre or project for a minimum of 5 years. Serious incident will be maintained as directed by the Legal and Insurance Department.

8.0 Attachments

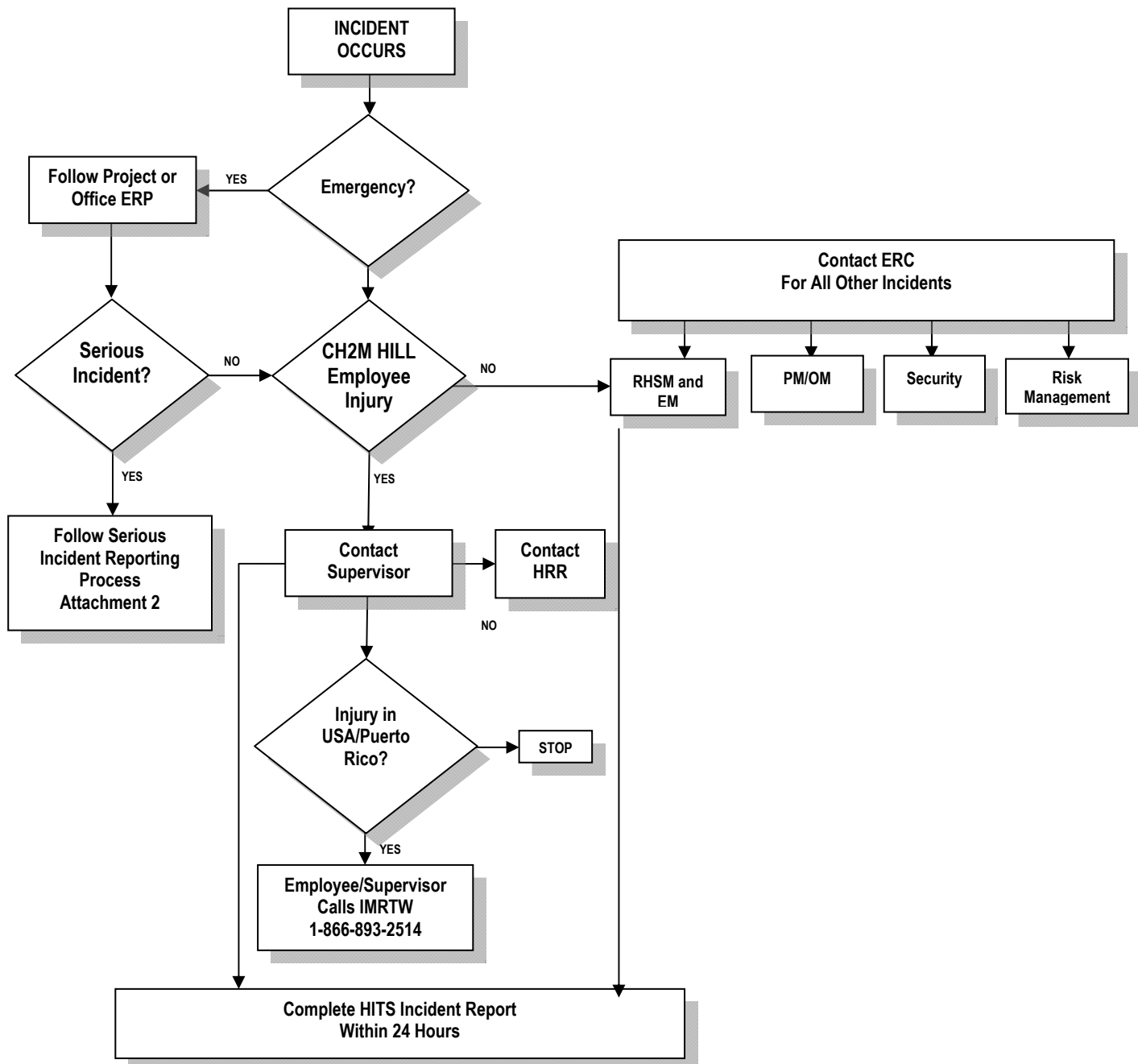
- Attachment 1 [Immediate Incident Notification Flowchart](#)
- Attachment 2 [Serious Incident Notification Flowchart](#)
- Attachment 3 [Agency Reporting for Environmental Spills](#)
- Attachment 4 [Incident Investigation Guidelines](#)
- Attachment 5 [HITS Incident Report Hardcopy \(Phase 1 – Initial Entry\) \(Phase 2- Evaluation\)](#)

9.0 Revision Log

Revision	Date	Description	Prepared By:	Approved By:
1	05/04/2007	Updated to include HITS process information and incorporated Serious Incident Reporting HSE - 601 into SOP.	Jeff Stumpf Mark Fagan	<i>R. Keith Christopher</i>
2	10/11/07	Revised section 4.11 and section 5.4.2 to include IRF review process by Enterprise HSE staff for OSHA recordability	Jeff Stumpf	<i>R. Keith Christopher</i>
3	12/30/2008	Revised section 5.4 and 5.4.2 to clarify injury/illness IRF requires OSHA recordability determination within seven days of incident	Jeff Stumpf	<i>R. Keith Christopher</i>
4	8/28/2009	Corrected outdated references and titles. Added new Attachment 3.	Meg Morrison	<i>R. Keith Christopher</i>
5	02/08/2010	Added definition of HITS under Section 3.0, and added 5.4.5, OSHA Reports for clarification.	Jeff Stumpf	<i>R. Keith Christopher</i>
6	02/15/2010	Added responsibilities for RHSM, BG HSE Lead, and BG EM for Root Cause Analysis and requirements to complete RCA in Section 5.5 and Attachment 4, Incident Investigation	Angelo Liberatore Bret Clausen Jeff Stumpf	<i>R. Keith Christopher</i>
7	03/30/2010	Clarification on contact to RHSM and EM for spills/releases in Sections 4.3 and 5.2, and Attachment 1: Immediate Incident Notification Flowchart. Add Attachment 5: HITS Incident Report Hardcopy (Phase 1	Jeff Stumpf	<i>R. Keith Christopher</i>

Revision	Date	Description	Prepared By:	Approved By:
		– Initial Entry)		

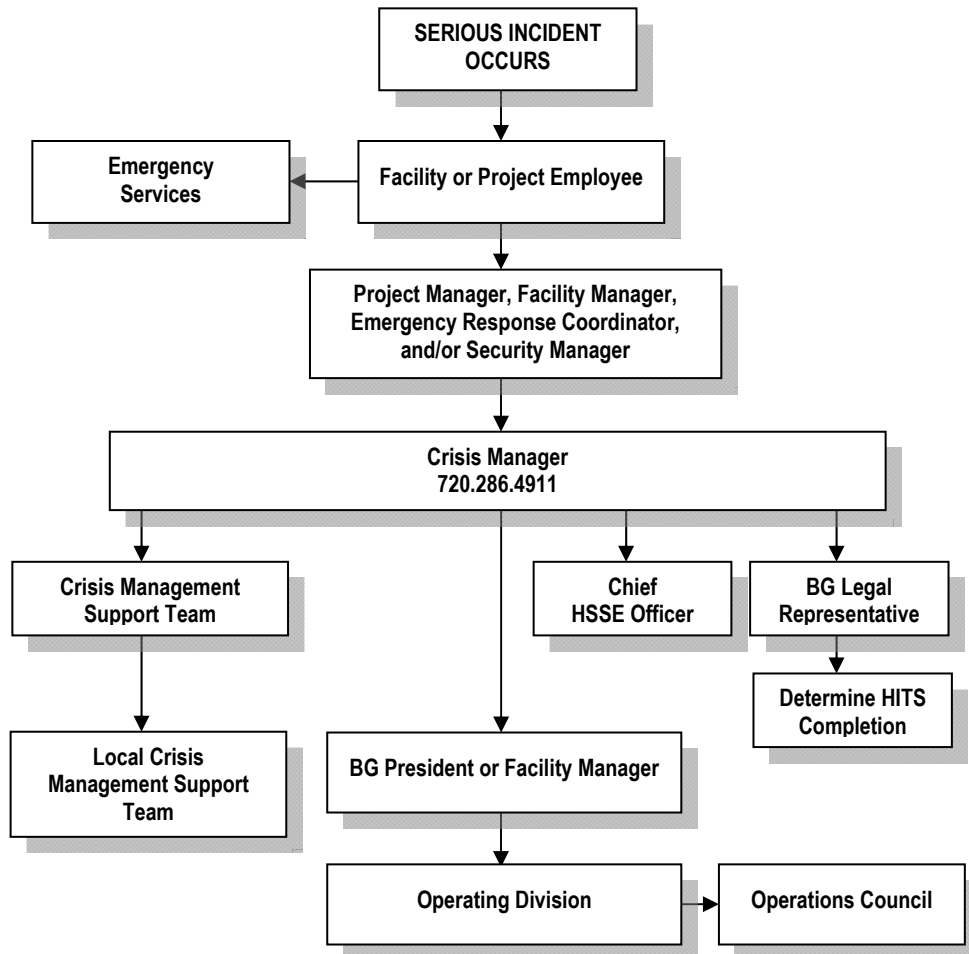
Attachment 1: Immediate Incident Notification



BGEM = Business Group Environmental Manager
ERC = Emergency Response Coordinator
(designated in Emergency Response Plan)
HITS = Hours & Incident Tracking System

HRR = Human Resources Representative
IMRTW = Injury Management/Return-to-Work
OM = Office Manager
PM = Project Manager

Attachment 2: Serious Incident Notification



LEGEND:

→ Direct line of communication

DEFINITIONS:

Local Crisis Management Team: Team comprised of key facility, project and/or business group personnel. Team is assembled as necessary and as appropriate to effectively manage and respond to a crisis situation (serious incident) at/on scene.

Crisis Management Support Team: Team comprised of key corporate personnel. Team is assembled as necessary and as appropriate to effectively support, direct, and/or supplement a Local Crisis Management Team.

Crisis Manager: Corporate based Crisis Manager, contactable by pager 24/7.



Incident Reporting and Investigation Standard Operating Procedure HSE-111

Attachment 3: Agency Reporting of Spills in the U.S.

Releases of chemicals into the environment must be reported to regulatory agencies under several environmental regulations, such as:

Legislation	Regulatory Citation
• Clean Air Act (CAA)	40 CFR 68, CAA Section 112(r)(1)
• Clean Water Act (CWA)	40 CFR 110.3, 40 CFR 112.4, 40 CFR 300.300
• Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	40 CFR 302
• Environmental Planning and Community Right to Know Act (EPCRA)	40 CFR 355.40
• Resource Conservation and Recovery Act (RCRA)	40 CFR 261.5, 40 CFR 262.34 (d)(5)(iv)(C) and 40 CFR 264/265.56(a)(2) and (h)(2)(i)
• Underground Storage Tank Rules	40 CFR 280
• Toxic Substance Control Act (TSCA), Polychlorinated Biphenyls (PCB) rule	40 CFR 761
• Department of Transportation (DOT) Hazardous Materials (49 CFR 171.15)	49 CFR 171.15
• Occupational Safety and Health Administration (OSHA)	29 CFR 1910.120(q)

In addition, state and local regulatory agencies may have their own reporting thresholds and requirements that may be more stringent than the Federal rules. It is not uncommon that reporting to both Federal and State agencies is required. Be sure to always check the state and local regulations for spill notification requirements.

This Attachment provides guidance on the CERCLA reporting requirements. Contact your CH2M HILL Business Group Environmental Manager for assistance with evaluating the release requirements under the other regulations mentioned above.

Definitions

Environment means (1) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (2) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States.

Immediate Notification – Although the term *immediate notification* is not defined in the regulation, the EPA generally defines immediate notification within 15 minutes of discovery of a reportable spill or release¹.

Navigable waters – Waterways, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, and wetlands, whose degradation or destruction could affect interstate or foreign commerce (such as recreation, shipping, fish and shellfish industry, and industrial production). Navigable water also consists of tributaries, wetlands, and tidal-influenced surface waters adjacent to the above waters (40 CFR 110).

Oil – Oil is defined as oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Specific Gravity – The density of a substance compared to the density of water. Substances with a specific gravity greater than 1 are heavier than water, and those with a specific gravity of less than 1 are lighter.

CERCLA Release Reporting Requirements

According to 40 CFR 302.6, the National Response Center (NRC) must be immediately notified of any non-exempt release of hazardous substance to the environment in an amount equal to or greater than its Reportable Quantity (RQ) within a 24-hour period. A release is considered to have entered the environment if it is not completely contained within a building.

Notification to the National Response Center can be made by phone at (toll free) 800-424-8802 or (toll) 202-267-2675. The NRC Online Reporting Tool is available at <http://www.nrc.uscg.mil/nrchp.html>. This online tool will submit an email back to the reporting party within 30 minutes of receiving a report with an incident report number.

What is a Hazardous Substance and Reportable Quantity?

The list of hazardous substances and their corresponding RQs is found in 40 CFR 302.4. CERCLA hazardous substances include:

- CWA hazardous substances in 40 CFR 117.3
- Hazardous waste
- Hazardous air pollutants under Section 112 of the CAA
- Imminently hazardous chemical substances and mixtures under TSCA
- Over 1,500 radionuclides (such as uranium, radium, thorium)

RQs for these substances range from 1 to 5,000 pounds. **Attachment 3-1** illustrates the calculations to convert the volume of liquids or gases released into pounds for RQ evaluations. An online tool called the RQ Calculator v2.0 can be found at <http://homer.ornl.gov/rq/>.

Petroleum and natural gas products are excluded from the definition of hazardous substances under CERCLA. The petroleum exclusion applies to crude oil, petroleum feedstocks, and refined petroleum products. Gasoline for instance would be exempt as a hazardous substance. However, the petroleum exclusion does not apply to hazardous substances that are added to petroleum after the refining process, or when increases in concentrations occur as a result of contamination during

¹ U.S. EPA Office of Regulatory Enforcement, Office of Enforcement and Compliance Assurance, Response Policy for Sections 304, 311, and 312 of the EPCRA and Section 103 of CERCLA. Sept. 30, 1999. Page 11 references the “15-minute” as coming from “The Legislative History of the Superfund Amendments and Reauthorization Act of 1986” (Volume 2, October 1990 pps.600-601).

petroleum use. Therefore, waste oil could be a hazardous substance if it has accumulated a hazardous substance, such as chromium, lead, or cadmium, during use.

States often have their own reporting requirements. For instance Texas has separate RQs for spills on land and spills into water and Louisiana has established an RQs for “oil.”

Note: If more than one hazardous substance is contained in a product, use the substance with the lowest RQ to determine if notification is required.

What is a Reportable Oil Spill?

The petroleum exclusion above is valid in certain circumstances, but not all. CERCLA regulations indicate that whenever a person in charge of a vessel or facility becomes aware that a discharge of oil which violates the CWA has occurred, or threatens to occur, that person must immediately notify the NRC (40 CFR 300.300).

The CWA reporting requirements apply to releases of hazardous substances above RQs and oil into navigable waters and shorelines (40 CFR 110.3). The definition of oil encompasses petroleum products (see Definitions). Notification to the NRC is required for discharges of oil that:

- Cause a sheen or iridescent rainbow effect on the water surface
- Violate state water quality criteria
- Cause a sludge or emulsion to be deposited on the shore or sediment

In essence, notification to the NRC is required for oil spills to surface water regardless of the quantity spilled or the size of the water body.

Who Should Report?

The Project Manager must notify the client immediately when a spill occurs. In addition to determining if the spill is reportable, the BGEM can also determine who should report it. In general, since CH2M HILL usually does not own the facility and does not directly manage hazardous substances, our client or subcontractor will be the “reporting party” or “suspected responsible party.” If a subcontractor reports a spill, CH2M HILL must make sure the client has first been notified and review the NRC report to ensure details are correctly reported. If our client or subcontractor refuses to notify the NRC when a release to the environment exceeds an RQ, CH2M HILL may report in certain instances after consultation with your BGEM and BG counsel.

Are there Penalties for Not Reporting?

Failure to comply with CERCLA release notification requirements may result in fines up to \$500,000 and prison sentences of up to three years (CERCLA Section 103).

To our knowledge no one has ever been fined for calling NRC when they didn’t need to do so.

What Information Is Requested When Reporting?

Reports taken by the NRC are based on incident type (sheen or continuous release, spills from storage tanks, pipelines, railroad, vessel, aircraft, etc). Each type requires a different subset of information. In general, the following information is requested:

- The reporting party contact information
- The suspected responsible party contact information

- Description and type of incident
- Date, time, location, County, latitude and longitude of incident, and nearest city
- Incident cause
- Released material(s) name, Chemical Abstract Service (CAS) registry number and quantity
- Medium affected (soil, gravel, water, air)
- Affected water body, nearest tributary, sheen dimensions, river mile marker, temperature, odor, and wave conditions, if applicable
- Tank or container details, if applicable
- Fire, injuries, evacuations, damages, and environmental impact
- Road, track, air corridor, or waterway closures
- Weather information
- Remedial action taken and whether the release is secured
- Additional agency notifications



Incident Reporting and Investigation Standard Operating Procedure HSE-111

Attachment 4: Investigation Guidelines

1.0 Introduction

This guideline is provided to assist in accessing, completing, and reviewing an incident investigation and RCA. It is important to remember the following when conducting an investigation:

- Gather relevant facts, focusing on fact finding, not fault finding.
- Draw conclusions, pitting facts together into a probable scenario.
- Determine incident root cause(s), which are basic causes on why an unsafe act/condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.

2.0 Documentation

The following should be included in the IRF to document the incident.

Description

- Provide a description of the event and the sequence of events and actions that took place prior to the incident. Start with the incident event and work backwards in time through all of the preceding events that directly contributed to the incident. The information should identify why the event took place as well as who was involved, when and where the event took place, and what actions were taken.

Cause Analysis

- Using a documented process such as the form and flowchart in Attachment 1 or equivalent, the root cause of the incident will be determined for all incidents where an RCA is required. An RCA shall be completed for all recordable injuries, property damage incidents in excess of \$5000.00(US), environmental permit violations, spills and releases which are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/REM is responsible for ensuring it is completed and results entered in the incident report form in HITS. RCA's shall be conducted using a Team which includes, at a minimum, the RHSM or designee, the involved party(ies), a responsible operations representative (e.g. PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

This documentation of the completed analysis must be retained in the project and/or RHSM files and cause information and corrective actions entered to the incident report in HITS.

Immediate Causes – List the substandard actions or conditions that directly affected the incident. The following are examples of immediate causes:

Substandard Actions: Operating equipment without authority; failure to warn; failure to secure; operating at improper speed; making safety device inoperable; using defective equipment; failing to use PPE; improper loading; improper lifting; improper position for task; under influence of alcohol or drugs; horseplay.

Substandard Conditions: Exposure to hazardous materials; exposure to extreme temperatures; improper lighting; improper ventilation; congestion; exposure to fire and explosive hazard; defective tools, equipment, or materials; exposure to extreme noise; poor ventilation; poor visibility; poor housekeeping.

Basic Causes — List the personal and job factors that caused the incident. The following are examples of basic causes:

Personal Factors: Capability; knowledge; skill; stress; motivation.

Job Factors: Abuse or misuse; engineering; maintenance; purchasing; supervision; tools and equipment; wear and tear; work standards.

Corrective Action Plan

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a time frame for completion. Be sure the corrective actions address the causes. For example, training may prevent recurrence of an incident caused by a lack of knowledge, but it may not help an incident caused by improper motivation.

The following are examples of management programs that may be used to control future incidents. These programs should be considered when determining specific corrective actions.

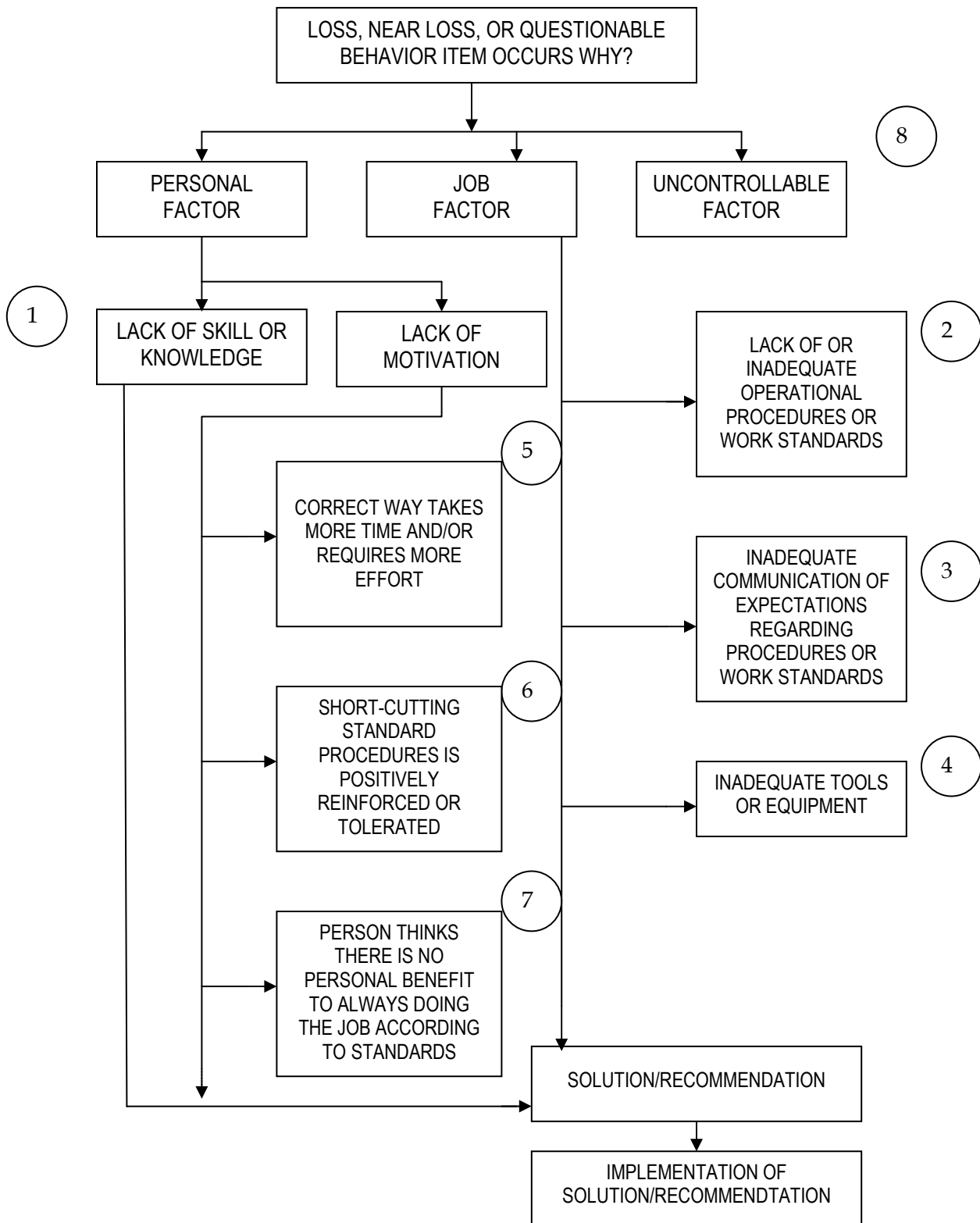
Management Programs: Accident/incident analysis; emergency preparedness; engineering controls; general promotion; group meetings; health control; hiring and placement; leadership and administration; management training; organizational rules; personal protective equipment; planned inspections; program audits; program controls; purchasing controls; task analysis and procedures; task observation

3.0 Root Cause Analysis Form and Flowchart

3.1 Root Cause Analysis Form

Root Cause Analysis (RCA)							
<p>Root Cause Categories (RCC): Select the RCC numbered below that applies for the root cause (RC) and/or contributing factor (CF) in the first column, then describe the specific root cause and corrective actions in each column.</p> <ol style="list-style-type: none">1. Lack of skill or knowledge2. Lack of or inadequate operational procedures or work standards3. Inadequate communication of expectations regarding procedures or work standards4. Inadequate tools or equipment5. Correct way takes more time and/or requires more effort6. Short-cutting standard procedures is positively reinforced or tolerated7. Person thinks there is no personal benefit to always doing the job according to standards							
RCC #	Root Cause(s)	Corrective Actions	RC ¹	CF ²	Due Date	Completion Date	Date Verified
¹ RC = Root Cause; ² CF = Contributing Factors (check which applies)							
Investigation Team Members							
Name		Job Title			Date		
Results of Solution Verification and Validation							
Reviewed By							
Name		Job Title			Date		

3.2 Root Cause Analysis Flowchart





Incident Reporting and Investigation
Standard Operating Procedure HSE-111

Attachment 5: HITS Incident Report Hardcopy

(Phase 1 – Initial Entry)

(Phase 2- Evaluation)

HITS Incident Report Hardcopy (Phase 1 – Initial Entry)

Phase 1 – Initial Entry

Type of Incident (May select more than one)

- | | | |
|--|---|------------------------------------|
| <input type="checkbox"/> Injury/Illness | <input type="checkbox"/> Spill/Release | <input type="checkbox"/> Near Miss |
| <input type="checkbox"/> Property Damage | <input type="checkbox"/> Environment/Permit | <input type="checkbox"/> Other |

General Information Section

Preparer's Name: _____ Preparer's Phone Number: _____

Date of Report: _____

Date of Incident: _____ Time of Incident: _____ AM / PM

What Business Group is accountable for this incident: _____

What Business Group SubGroup is accountable for this incident: _____

What CH2M HILL Company is accountable for this incident: _____

Where did the Incident occur?

- ☐ United States, Geographic Region: _____
- ☐ Canada, Province/Territory: _____
- ☐ International, County: _____

Location of Incident?

- ☐ Company Premises, CH2M HILL Office (use 3 letter office code if available): _____
- ☐ Project, Project name: _____
- ☐ In Transit
- Traveling from: _____
- Traveling to: _____
- ☐ At Home
- ☐ Other, Specify: _____

Describe the incident: _____

Provide Witness Information:

Name: _____	Phone: _____
Name: _____	Phone: _____
Name: _____	Phone: _____

Personnel Notified of Incident (Provide name, date and time):

CH2M HILL Personnel:

Client Personnel:

Additional Comments:

Injury/Illness Section [Complete only if Injury/Illness Incident type selected]

Who was injured?

- ☐ CH2M HILL Employee or CH2M HILL Temp Employee
- ☐ Subcontractor to CH2M HILL (Non-LLC Joint Venture Project)
- ☐ LLC Joint Venture Partner Employee
- ☐ LLC Joint Venture Project Subcontractor/Contractor
- ☐ Other

Name of Injured: _____ Job Title: _____

Employer Name: _____ Supervisor of Employee: _____

Complete for CH2M HILL Employee Injuries

Business Group of Injured Employee: _____

Has the Employee Called Injury Management Administration Return to Work Medical Provider?

☐ Yes ☐ No ☐ Not Applicable

Has the injured employee's supervisor been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Complete for Non-CH2M HILL Employee Injuries

Has the project safety coordinator been notified of this incident?

☐ Yes ☐ No ☐ Not Sure

Project Safety Coordinator: _____

Body Part Affected: _____

Injury/Illness (Result): _____

Describe treatment provided (if medication provided, identify whether over-the-counter or prescription): _____

Describe any work restriction prescribed (include dates and number of days): _____

Physician/Health Care Provider Information

Name: _____ Phone: _____

Was treatment provided away from the worksite?

☐ No
☐ Yes

Facility Name: _____

Address: _____

City: _____ Phone Number: _____

Was injured treated in an emergency room?

☐ No ☐ Yes

Was injured hospitalized overnight as an in-patient?

☐ No ☐ Yes

General Information Environmental Section [Complete only if Environment/Permit or Spill/Release Incident type selected]

Who had control of the area during the incident?

- ☐ CH2M HILL, Company: _____
☐ Subcontractor, Company: _____
☐ Joint Venture Partner/Contractor/Subcontractor, Company: _____
☐ Other, Company: _____
Relationship to CH2M HILL: _____

Property Damage Section [Complete only if Property Damage Incident type selected]

Property Damaged: _____

Property Owner: _____

Damage Description: _____

Estimated US Dollar Amount: _____

Spill or Release Section [Complete only if Spill/Release Incident type selected]

Substance: _____

Estimated Quantity: _____

Did the spill/release move off the property?: _____

Spill/Release From: _____

Spill/Release To: _____

Environment/Permit Section [Complete only if Environment/Permit Incident type selected]

Describe Environmental or Permit Issue: _____

Permit Type: _____

Permitted Level or Criteria (e.g., discharge limit): _____

Permit Name and Number (e.g., NPDES No. ST1234): _____

Substance and Estimated Quantity: _____

Duration of Permit Exceedence: _____

HITS Incident Report Hardcopy (Phase 2 – Evaluation)

Phase 2 – Evaluation Section

Injury/Illness Evaluation Section [This section used only for Injury/Illness Cases]

Incident Category:

- ☐ Contact (injuries where one is stuck by, struck against, or caught between objects)
- ☐ Exposure (exposure to plants, insects, animals, temperature, chemicals, contaminants, or substances)
- ☐ Fall from Same Elevation (Slip/Trip)
- ☐ Fall from Height
- ☐ General Health (examples are asthma, chest pains, stress, etc.)
- ☐ Lifting (injuries from lifting, moving or carrying objects)
- ☐ Motor Vehicle Accident (injuries as a result of driving, being a passenger or being struck by a vehicle)
- ☐ Overexertion (overexertion of body parts not caused by repeated motion, shoulder strain closing door)
- ☐ Repeated Motion to Wrist/Hand
- ☐ Repeated Motion other than to Wrist/Hand

Work-related

- ☐ Yes ☐ No, Explain: _____

New Case

- ☐ Yes ☐ No, Explain: _____

Recordable

- ☐ No ☐ Yes, Explain: _____

Complete only for Recordable Cases

Incident type

- ☐ Injury
- ☐ Illness
 - ☐ Skin disorder
 - ☐ Respiratory condition
 - ☐ Poisoning
 - ☐ Hearing Loss
 - ☐ All other illnesses

Incident Severity (*Only select one category – most severe*)

- ☐ Fatality
Date of death: _____
- ☐ Days away from Work Case
Days away from Work (180 Maximum): _____
Days of Restricted Duty or Transfer (180 Maximum): _____
- ☐ Restricted Duty or Transfer to another job Case
Days of Restricted Duty or Transfer (180 Maximum): _____
- ☐ Other Recordable Case
 - ☐ Medical treatment, medical treatment provided: _____
 - ☐ Loss of Consciousness
 - ☐ Significant Injury
 - ☐ Cancer
 - ☐ Chronic irreversible disease
 - ☐ Fractured or cracked bone
 - ☐ Punctured eardrum
 - ☐ Special Case
 - ☐ Needlestick or Sharps injury
 - ☐ Medical Removal Case
 - ☐ Hearing Loss
 - ☐ Tuberculosis Case
 - ☐ Musculoskeletal disorder

OSHA Log Date: _____

OSHA Log Location

- ☐ Office, CH2M HILL Office (use 3 letter office code if available): _____
- ☐ Project, Project name: _____

OSHA Log Company: _____

OSHA Log Incident Location (2nd floor MKE office): _____

International Categorization – Is this incident recordable or reportable by local statutory requirements? [Complete for non-US cases]

☐ No ☐ Yes, Explain: _____

Environmental Evaluation Section [Complete only for Environmental/Permit Issue & Spill/Release Incident Types]

CERCLA Hazardous Substance:

☐ Yes ☐ No

Extremely Hazardous Substance:

☐ Yes ☐ No

Federal RQ Exceeded:

☐ Yes ☐ No

State RQ Exceeded:

☐ Yes ☐ No

Reportable to Agency:

☐ Yes ☐ No

Environmental Manager's Analysis: _____

Violation or Notice of Violation issued:

☐ Yes ☐ No

HSE&Q Evaluation Section [Complete for all Incident types]

Incident Description Summary: _____

Cause of Event:

- ☐ Substandard Practice (*pretty clear cut – employees fault*)
- ☐ Substandard Practice/ Substandard Condition (*Practice was primary cause but Condition could not be discounted as a significant portion of the cause*)
- ☐ Substandard Condition/ Substandard Practice (*Condition was primary cause but Practice could not be discounted as a significant portion of the cause*)
- ☐ Substandard Condition (*pretty clear cut – employee was an unavoidable victim*)

Describe Root Cause and Contributing Factors: _____

Corrective action/lessons learned: _____

Comments: _____

Person who conducted HSE&Q evaluation: _____

Incident Report Status:

☐ Open ☐ Closed



Manual Lifting

Enterprise Standard Operating Procedure HSE-112

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must comply with when performing tasks or activities that involve manual lifting. The purpose of this SOP is to identify manual lifting hazards and mitigate the risk associated with manual lifting tasks or activities.

2.0 Scope and Application

2.1 Scope

This SOP provides CH2M HILL employees with the information to recognize the hazards associated with manual lifting and the safe work practices to follow when performing manual lifting tasks and activities.

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL Legal Entities that operate in the United States (U.S.) and internationally when CH2M HILL employees are required to perform tasks or activities that involve manual lifting.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedures that are applicable to this SOP are as follows:

- [HSE -109, Audits](#)
- [HSE-110, Training Program](#)
- [HSE-114, Office & Warehouse Safety Program](#)
- [HSE-215, Contracts and Subcontracts](#)
- [HSE-303, Cranes](#)
- [HSE-309, Forklifts](#)

3.0 Definitions

3.1 Manual Handling

Manual handling is defined as any activity requiring use of force exerted by a person to lift, push, pull, carry or otherwise move, hold, or restrain objects.

4.0 Roles and Responsibilities

The roles and responsibilities required to implement the manual lifting program are listed in the following subsections.

4.1 Safety Coordinator (SC)

The SC is either the Site Manager (SM), or is designated by the SM to implement the project HSP or FSI. The SC assists the SM and Responsible Health and Safety Manager (RHSM) with implementing the manual lifting requirements described in this SOP, the project Health and Safety Plan (HSP) or Field Safety Instruction (FSI), or Activity Hazard Analysis (AHA).

4.2 CH2M HILL Employees

All CH2M HILL employees who perform manual lifting must complete the required training, and follow procedures described in this SOP, the HSP or FSI, or AHA.

5.0 Requirements

The following manual lifting requirements must be implemented.

5.1 Safe Work Practices

- When possible, the task should be modified to reduce or minimize manual lifting hazards.
- All employees must receive training on how to lift safely.
- Effectiveness of manual handling control measures will be evaluated during assessments. (See SOP HSE-114, Office Safety Program, or SOP HSE-109, Project Audits.)
- Manual handling incidents are reviewed as part of the HSE Program reviews, and the results influence program development, training, and education efforts.
- Lifting of loads weighing more than 40 pounds (18 kilograms) should be evaluated by the Safety Coordinator-Hazardous Waste (SC-HW), Safety Coordinator-Construction (SC-C), or Office Safety Coordinator/Committee Member using the Lifting Evaluation Form contained in Attachment 1 to determine the injury risk for the individual performing the lift.

5.1.1 Office Environments

The primary manual handling risk of moving heavy objectives is lifting. While the specific size and weight of objects lifted varies from boxes of paper (all employees),

printers/computers (IT staff), furniture (office services staff), to equipment (warehouse personnel), the following control measures are the same:

- Employee education and training
- Mechanical devices, such as hand trucks and trolleys
- Assistance provided by other staff or subcontractors

Because all employees may be exposed to manual handling hazards at any time, employee education is an ongoing process, and mechanical devices and assistance are readily available. Before an event that may increase exposure (e.g., an office move), education and training of affected employees is necessary, as well as arranging for mechanical devices and assistance to be available. Additional Health, Safety, and Environmental Protection procedures for office safety can be found in SOP HSE-114, Office Safety Program.

5.1.2 Field Projects

Manual lifting risks are common with field projects and should be identified during development of the project's written safety plan. During the review of the safety plan, the RHSM assesses the manual lifting hazards and establishes the appropriate control. If training, other than that received during the safety orientation, is required, the RHSM will work with the project manager (PM) to determine appropriate training according to the procedures contained in SOP HSE-110, Training.

If a manual lifting risk is identified and not addressed in the written site safety plan, the SC-HW or SC-C must contact the RHSM to update the plan to include the new lifting hazard and appropriate control measures.

5.2 Mechanical Lifting

Using mechanical lifting devices is the preferred means of lifting heavy objects. Additionally, awkward or oddly shaped objects may require the use of a mechanical lifting device. Mechanical devices include forklifts; cranes, hoists, and rigging; hand trucks; and trolleys. Procedures for operating forklifts and cranes, hoists, and riggings are contained in SOP HSE-309, Forklifts and SOP HSE-303, Cranes, respectively. The safe operating procedures to use when operating either a hand truck or trolley are as follows:

- Before use, visually inspect the hand truck or trolley for broken or damaged components.
- Check the travel path for uneven surfaces, water, oil, or cracks and holes before using the equipment.
- Make sure the load is balanced and sturdy (boxes are dry and undamaged), and secure load, if necessary.
- When moving a load on level ground, push the load.
- When moving a load on a slope, keep the load on the downslope side of you.
- Move slowly and cautiously.
- Make sure that you can see over the load.

5.3 Assisted Lifting

Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities. Coordinate positioning and movements so that the load is evenly distributed by all personnel assisting in the lift.

5.4 Manual Lifting

Physical differences make it difficult to set up safe lifting limits, unless extensive individual testing is performed. In general, the following steps should be practiced when planning and performing manual lifts.

5.4.1 Assess the Situation Before the Lift

Before lifting and carrying a heavy object, take a few moments to assess the situation and the characteristics of the item to be lifted.

- Determine the distance you have to carry the load.
- Clear the path of clutter, cords, slippery areas, overhangs, stairs, curbs, or uneven surfaces.
- Open doors that are closed, and ask someone to hold a door open or place a wedge under the door to keep it in the open position.
- Determine if you will be able to see over the load, or if the load block will your view.
- If you cannot see over the load, if it is heavy, or if it is awkwardly shaped, disassemble the load, carry in pieces, and then reassemble it (if possible).
- Consider the size, weight, and shape of the object to be carried. Evenly distribute the load, if possible.
- “Size up the load” before you lift. Test the weight by lifting a corner of the object. If it is too heavy or if the object is an odd shape, STOP!
- Inspect the load to be lifted for sharp edges, slivers, and wet or greasy spots.
- Ask for help. Two or three people lifting a heavy object are much safer than trying to do it yourself.
- Use a hand truck, pushcart, or a mechanical lifting device.
- Consider using gloves that will improve your grip and protect your hands.
- Never lift anything, unless you are sure you can do so safely.

5.4.2 Lifting the Load

The key to lifting safely is keeping your back straight or slightly arched. NEVER USE YOUR BACK TO LIFT!

- Start the lift by putting your feet close to the object. Get firm footing. One foot can be slightly ahead of the other for increased effectiveness. Your feet should be far enough apart to give good balance and stability (approximately shoulder width).

- Center your body over your feet.
- Squat down like a professional weightlifter, bending your knees. Keep your back straight or slightly arched. You want your legs to do the lifting, not your back.
- Grasp the load securely with your hands, and pull the load close to you.

Smoothly lift straight up. NEVER TWIST YOUR BODY WHILE LIFTING. KEEP YOUR HEAD UP, AS IF LOOKING STRAIGHT AHEAD, NOT DOWN.

5.4.3 Carrying the Load

The following should be done as you carry the load:

- Keep your back straight or slightly arched.
- Walk slowly and surely.
- Use your feet to change directions. Never twist your back.
- Avoid leaning over.
- Avoid lifting a load over your head.
- Maintain your grip while lifting and carrying. Before changing or adjusting this grip, set the object down.

If you become tired, set the load down, and rest for a few moments.

5.4.4 Setting the Load Down

Setting the load down is the reverse of lifting.

- Position yourself where you want to set the load.
- Squat down. Let your legs to do the work, not your back.
- REMEMBER NOT TO TWIST YOUR BODY WHILE SETTING DOWN A LOAD, AND KEEP YOUR HEAD UP.
- Never turn at the waist to change direction or to put the object down. Turn the whole body, and crouch down to lower the object.
- Once the load is where you want it, release your grip. Never release your grip on a load until it is secure. You do not want to drop a load on your foot. Or, if someone is helping you, dropping a load unexpectedly can injure the other person.

6.0 Training

CH2M HILL will provide employees with training and information on lifting. This training and information is intended to prepare employees to do the following:

- Reduce or eliminate the need for manual lifting by using mechanical lifting equipment
- Seek assistance when performing manual lifting tasks

- Perform manual lifting tasks using proper techniques

Employees who complete New Employee HSE Orientation are provided with training in manual lifting. Employees who have not completed New Employee HSE Orientation can access the training in the HSE website.

7.0 Forms/Checklists

For loads weighing more than 40 pounds (18 kilograms), the Lifting Evaluation Form (Attachment 1) should be completed to determine the lifting risk.

The “HSE Self-Assessment Checklist – Lifting” in Attachment 2 is provided as a method for assessing and verifying that safe work practices are being used. CH2M HILL’s SC-HW or SC-C (including Office Coordinators/Committee Members) use this checklist when:

1. CH2M HILL employees are performing lifting tasks or activities.
2. CH2M HILL oversight of subcontractor tasks or activities involving manual lifting is required by the “Subcontractor, Contractor, or Owner” SOP, HSE-215, Contracts and Subcontracts.

HSE staff will specify the frequency with which this checklist should be completed in the project’s written safety plan. HSE staff will assist the SC-HW or SC-C in resolving any deficiencies identified during the self-assessment.

8.0 References


None

9.0 Attachments

Attachment 1: [Lifting Evaluation Form](#)

Attachment 2: [HSE Self-Assessment Checklist – Lifting](#)

10.0 Revision Log





Revision	Date	Description	Prepared By	Approved By
1	7/02/ 2007	Updated to Standard Operating Procedure	Sandy Wise; Jeff Stumpf	



Attachment 1: Lifting Evaluation Form

LIFT EVALUATION FORM

Form Instructions: This form is to be used when employees expect to lift an object weighing more than 40 pounds (18 kilograms). To evaluate a lift please complete the first four steps and input your evaluation factors in Step 5. Based upon the evaluation factors, calculate the overall Lifting Evaluation Factor. Then determine the lift Risk Level and Evaluation Actions (Step 6).

Risk Level and Evaluation Factors (Step 2)							
Step 1: Load Weight Factor	Actual Load Weight		Load Weight Factor	Step 3: Posture Factors	Posture and Position of Lift		Posture Factor
	< 10 pounds (4.5 kg.)		1		 Upper body upright, not twisted Load close to body Standing or walking a few steps Slight inclination forward or twisting of upper body	1	
	11 to 20 pounds (5 to 9 kg.)		2				
	21 to 35 pounds (9.5 to 15 kg.)		4				
	36 to 50 pounds (16 to 22.5 kg.)		7				
>50 pounds (22.5 kg.)		10					
Step 2: Duration/Frequency Factor	Lifting Conditions		Lifting Condition Factor	Step 3: Posture Factors	Slight inclination forward or twisting of upper body		2
	Good ergonomic conditions: Adequate space Level and solid floor or ground Adequate lighting Good gripping conditions Stable load		0		 Load close to body Standing or walking longer distances		
	Undesirable ergonomic conditions: Restricted movement Restricted area height (less than 5 feet or 1.5 meters) Floor uneven, soft, slippery, or sloping Uneven weight distribution		1		 Low bending or extensive inclination forward Slight inclination forward with simultaneous twisting of upper body Load away from body or above shoulder height Sitting	4	
					 Extensive inclination forward with simultaneous twisting of upper body Load away from body Restricted stability of posture when standing, squatting, or kneeling		8
Step 4: Duration/Frequency	Lifts per Minute		Hours per Day			<i>The number of lifts performed per minute and the duration of the lifts will determine the Duration/Frequency Factor</i>	
			<1 hr.	1 to 2 hours	> 2 hours		
	< 1 lift per min.		1	2	4		
	1 lift every min.		2	2	4		
	2-3 lifts per min.		2	4	6		
	4-5 lifts per min.		4	4	6		
	6-7 lifts per min.		4	6	8		
8-9 lifts per min.		6	8	8			
> 9 lifts per min.		8	8	8			

Step 5: Lifting Evaluation	Load Weight Factor		Lifting Condition Factor		Posture Factor		Duration/Frequency Factor		Lifting Evaluation Factor
		+		+		X		=	

Step 6: Risk Level and Evaluation Actions	Lifting Risk Factor	Risk Level and Evaluation Actions
	<10	Low Risk - No action needed at this time
	10 to 25	Elevated Risk - Reduce Lifting Evaluation Factor by addressing the concerns of the Posture and Conditions Factors
	26 to 50	Increased Risk - Reduce Lifting Evaluation Factor by reducing Load Weight Factor and/or the Frequency/Duration of the lifts. Mechanical lifting devices may be used or assistance from other workers.
	>50	High Risk - Reduce Lifting Evaluation Factor by reducing each of the contributing factors. If Lifting Evaluation Factor cannot be reduced, then mechanical lifting devices or assistance from other workers is necessary.



Attachment 2: Self-Assessment Checklist—Manual Lifting



HSE Self-Assessment Checklist—Lifting

This checklist shall be used **only** by CH2M HILL personnel and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees perform manual lifting activities (office or projects), and/or (2) CH2M HILL provides oversight of a subcontractor performing manual lifting activities. SC or Office Safety Coordinators/Committee members may consult with subcontractors (if applicable) when completing this checklist but shall not direct the means and methods of activities nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until corrected. Complete the appropriate project or office information:

Project Information					
Project Name: _____		Project No.: _____			
Location: _____		PM: _____			
Auditor: _____		Title: _____		Date: _____	
Office Information					
Office Location: _____					
Auditor: _____		Title: _____		Date: _____	
<p>This specific checklist has been completed to:</p> <p><input type="checkbox"/> Evaluate CH2M HILL employee manual lifting activities.</p> <p><input type="checkbox"/> Evaluate a CH2M HILL subcontractor's manual lifting activities.</p> <p>Subcontractor Name: _____</p> <ul style="list-style-type: none">• Check "Yes" if an assessment item is complete/correct.• Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor.• Check "N/A" if an item is not applicable.• Check "N/O" if an item is applicable but was not observed during the assessment. <p>Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-112.</p>					
Planning Activities		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
1.	Efforts have been made to inquire about receiving equipment or supplies in containers weighting less than 50 pounds (23 kilograms).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Equipment or supplies are being delivered as close as possible to their use point.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Heavy equipment or supplies are being stored off the ground and no lower than knee height.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Adequate space has been provided to access and lift equipment or supplies without reaching or twisting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safe Work Practices (5.1)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
5.	Tasks or activities have been modified to reduce or minimize manual lifting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	All employees performing manual lifting have received training on how to lift safely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	Manual lifting control measures are evaluated during assessments.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8.	Manual lifting incidents are reviewed as part of the HSE Program reviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	Manual lifting incidents are reviewed as part of the HSE Program reviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Office Environments (5.1.1)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
10.	Employees have received lifting training.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	Mechanical devices are readily available to employees handling equipment or supplies weighing more than 40 pounds (18 kilograms).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Field Projects (5.1.2)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
12.	All manual lifting tasks or activities have been addressed in the written site safety plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	Employees have received safe lifting training as required by the written site safety plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mechanical Lifting (5.2)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
14.	Hand trucks and trolleys are visually inspected before use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	Hand trucks and trolleys do not have any broken or damaged parts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	Hand truck and trolley paths are free of uneven surfaces, water, oil, or cracks and holes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	Loads carried by hand trucks are balanced and sturdy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	Hand trucks or dollies are being pushed when on level ground.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	When going up or down a slope using a hand truck or trolley, the load is downslope of the person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	Employees using hand trucks or dollies are moving slowly and cautiously.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21.	Employees using hand trucks or trolleys are able to see over the load.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assisted Lifting (5.3)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
22.	Personnel are not performing manual lifting beyond their physical capabilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23.	Loads are evenly distributed when being handled by multiple people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual Lifting (5.4)		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
24.	Before the lift, the load and path was assessed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	Loads being lifted are free of sharp edges, slivers, or wet or greasy spots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26.	Gloves are used for manual lifts of loads with sharp or splintered edges.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27.	Employees performing manual lifts use the proper lifting techniques.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.	Special tools fabricated for lifting grates or manhole covers are used.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[illegible]

Auditor: _____ Project Manager: _____



Personal Protective Equipment (PPE) Enterprise Standard Operating Procedure HSE-117

1.0 Purpose

This Enterprise HSE Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must comply with when implementing a personal protective equipment (PPE) program.

1.1 References

The following regulations were referenced to prepare this Enterprise SOP:

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response; 29 CFR 1910.132 "Personal Protective Equipment; 1910.133, "Eye and Face Protection; 1910.135, "Head Protection; 1910.137, "Electrical Protection Device; 1910.138; "Hand Protection

2.0 Scope and Application

2.1 Scope

CH2M HILL employees shall use PPE when actual or potential hazards exist, and engineering controls or administrative practices cannot adequately control those hazards. This SOP describes the requirements for eye and face, head, foot, hand, and body protective equipment. Respiratory protection, hearing conservation, and fall protection programs are covered in separate health, safety and environmental (HSE) SOPs.

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL Legal Entities that operate in the United States (U.S.) and internationally when CH2M HILL employees are required to wear personal protective equipment regardless of the company responsible for operations (i.e., CH2M HILL, subcontractor, or third-party contractor).

Where state OSHA agencies may have more stringent requirements, contact the appropriate Responsible BG Health and Safety Manager to address these specific requirements.

For international operations, this SOP should be followed as a minimum requirement, unless country-specific HSE regulations (i.e., Canada, Australia, or European Union countries) for PPE selection and use are more stringent. A country-specific SOP must be developed to comply with company and country-specific PPE regulations.

2.3 Applicable Enterprise SOPs

The following Enterprise SOPs are applicable to this PPE SOP:

- [HSE SOP-206, Electrical Safety](#)
- [HSE SOP-211, Heat and Cold Stress](#)
- [HSE SOP-218, Hazardous Waste Operations](#)
- [HSE SOP-221, Energized Electrical](#)
- [HSE SOP-314, Welding and Cutting](#)

3.0 Definitions

None.

4.0 Roles and Responsibilities

Listed are the roles and responsibilities required to implement the company PPE program.

4.1 Business Group (BG) Health and Safety Lead

The BG H&S Lead oversees the implementation of the PPE program for all projects in their BG. The BG H&S Lead has the authority to approve deviation from this SOP to accommodate requirements outside the U.S.

4.4 Project Manager (PM)

The PM has overall HSE management responsibility for implementing the requirements in this SOP but may delegate specific tasks to other project staff, such as the Site Manager (SM). The PM will provide the RHSM and SC with project-specific information to complete the PPE evaluation; ensure PPE is acquired, worn, and maintained by project employees; and verify that the certified PPE assessment is completed.

4.5 Responsible Health and Safety Manager (RHSM)

The Responsible Health and Safety Manager (RHSM) is assigned by the BG HSE Lead to conduct the PPE evaluation, select the appropriate PPE for the project, list the requirements in the project Health and Safety Plan (HSP) or Field Safety Instruction (FSI), coordinate with the SM or Safety Coordinator (SC) to complete and certify the PPE hazard assessment, and conduct project H&S audits on the effectiveness of PPE program.

4.6 Safety Coordinator (SC)

The SC is either the SM or is designated by the SM to implement the project HSP or FSI. The SC assists the SM and RHSM with the PPE evaluation, implements the PPE requirements described in the project HSP or FSI, works with SM or RHSM to complete and certify the PPE hazard assessment, and receives input from project staff that the assigned PPE meets ongoing requirements and effectiveness.

4.7 Safety Program Assistants (SPAs)

The SPA processes requests from the SC for obtaining reusable PPE, coordinates PPE distribution with the regional equipment specialist, and maintains basic PPE supplies at office locations.

4.8 Regional Equipment Specialist (RES)

The RES maintains a standard inventory of PPE, and inspects and ships PPE to projects as requested by the SPA, RHSM, or SC.

4.9 CH2M HILL Employees

All CH2M HILL employees who use PPE must complete the required training and ensure the PPE is properly worn, maintained, and stored following the prescribed procedures described in this SOP, the HSP, FSI, or Activity Hazard Analysis (AHA).

5.0 Requirements

The following PPE requirements described in this Enterprise SOP must be implemented.

5.1 General

PPE shall be provided to employees when engineering controls or administrative practices cannot eliminate actual or potential hazards, or as a supplement to controlling workplace hazards. General requirements for PPE use include the following:

- A risk assessment must be conducted to determine what PPE is required.
- Employees must be provided with the required PPE to meet specifications adopted by regulatory agencies.
- Employees must comply with the PPE requirements as specified in the site-specific HSP, FSI, and/or AHA.
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage.
- PPE must be maintained in a clean and reliable condition.
- Damaged PPE shall not be used and must either be repaired or discarded.
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The US Environmental Protection Agency (EPA) developed the “Level of Protection” system for classifying protective clothing at hazardous waste sites. This PPE classification system can be applied as a guideline for assessing and selecting PPE not only for hazardous waste site work but also for general work environments. Attachment 1 lists the typical equipment for each level of protection.

5.2 Hazard Assessment

Based on project-specific information provided by the PM, the RHSM and SC will conduct an assessment to determine what PPE is needed. The RHSM shall specify the hazards and tasks that require PPE to be used and list the requirements in the site-specific HSP or FSI.

Verification of the PPE hazard assessment must be completed by the SM, SC, or RHSM through a written certification identifying the workplace evaluated, the certifying person, and date(s) of assessment. This must be completed by designating the assigned PPE for each task in the HSP, FSI, or AHA with sign-off by the SM, SC, or RHSM.

The PPE assessment must take into account the following considerations:

- Engineering controls and safe work practices shall be considered first. When these methods cannot eliminate the hazard, PPE shall be used.
- The necessity for PPE is typically based on either hazards present in the work area or hazards created by the tasks to be performed.
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area.
- Areas where tasks requiring PPE are taking place may become PPE-required areas as long as that specific task is taking place.
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner.

5.3 Equipment Selection

The RHSM selects PPE that meets the required standards or certifying-body specifications (e.g., ANSI, ASTM, CAN/CSA, CE/EN, AS/NZS) adopted by regulatory agencies.

PPE must be selected based upon the following considerations:

- Type of contact or exposure to the hazard
- Dexterity or ease of movement needed for the task
- Potential stress to the employee such as heat or limited visibility by wearing the PPE
- Adjustability or size matched to the employee
- Potential for PPE failure based on the task
- PPE maintenance
- Regulatory decontamination or disposal requirements

5.4 Acquiring PPE

Acquiring and funding PPE are based upon resources provided by the Business Group, or geographic location of the project. Employees will be issued their own PPE. For PPE that is shared, such as with reusable gloves or body protection, the PPE must be maintained in a clean and sanitary condition for the next user.

For acquiring PPE for projects within the U.S., the following applies:

- Reusable PPE that can be obtained through the appropriate SPA or RES. The employee must receive prior approval from the SPA to receive reusable PPE.

- PPE can be ordered using the request form on the HSE web site.
- Standard gear is provided in the “red bag” for construction or hazardous waste projects.
- Safety shoes and prescription safety glasses are purchased by the employee up to an established, reimbursable dollar amount using the expense report system. The employee is responsible for cost of the eye examination.
- Disposable and project-specific PPE is funded by the project, provided by the SC, through the SPA, RES, or local vendor.
- When CH2M HILL employee-owned PPE is permitted, CH2M HILL is responsible for its adequacy, maintenance and sanitation.

Acquiring Canadian PPE is accomplished in a fashion similar to the U.S., except local vendors are used for supplying Canadian-approved PPE. The amount reimbursable for safety shoes and prescription safety glasses is equivalent in value to the U.S.

Acquiring PPE for International projects is based upon procedures and practices established by the BG HSE Lead or region Health and Safety Manager.

5.5 Cleaning and Maintenance

Personal protective equipment, including employee-owned, must be maintained in a clean and sanitary condition, stored to prevent deformity or distortion, and decontaminated and/or disposed of in accordance with applicable regulatory requirements.

Listed are requirements for cleaning and maintaining PPE:

- Shared PPE must be cleaned after each use.
- PPE cleaning supplies must be readily available for employee use.
- Decontamination or laundering of PPE must follow manufacturer’s guidelines. When commercial laundries are used for all cleaning of contaminated reusable PPE they must be notified in writing of the potential for contamination, applicable hazard warnings, and safe handling practices. Home laundering PPE is prohibited.
- Disposal of chemically contaminated PPE or decontamination cleaning solutions and rinse waters, must be in accordance with regulatory waste management requirements. Refer to HSE SOP-218, Hazardous Waste Operations.

5.6 Types of PPE

5.6.1 Eye and Face Protection

Eye and face protection is required for protection from flying particles, molten metal, liquid chemicals, chemical gases or vapors, glare or potentially injurious light radiation. Contact lenses are not considered protective devices and shall not be worn when chemical exposure can create an eye hazard or cause damage to the lenses.

Eye and face protection includes safety glasses, prescription safety glasses with side shields, respirator glass inserts, goggles, face shields, and welding goggles or helmets. Cleaning and defogging solutions should be used often to keep lenses clean and free from fogging.

Scratched or pitted lenses can reduce visibility and must be replaced. Eye and face protection meeting country-specific regulatory requirements must be used. For example, OSHA requires protective eyewear meet ANSI Z87.1.

Guidelines for eye and face protection include the following:

- Safety glasses are the basic form of eye protection and are required where general eye hazards are present. Tinted or shaded safety glasses may be used for protection from glare when working in bright environments but should not be worn inside buildings or for observing welding or cutting operations.
- Prescription safety glasses with side-shields should be worn by employees requiring corrective eyewear. Safety glasses or goggles can be worn over standard prescription glasses to provide adequate eye protection but may not be as comfortable wearing only prescription safety glasses
- Prescription glass inserts are available for full-face respirators. The RES or an authorized vendor supplies the spectacle kit matched to the respirator, which is provided to an optometrist for the lenses.
- Goggles must be worn when conducting tasks that generate flying particles or handling chemicals for protection from eye irritation due to airborne chemicals or minor splashes.
- Face shields in combination with safety glasses or goggles must be used when there is potential for exposure to chemical splashes, acid or caustic handling, extreme heat, flying particles or sparks, or arc flashing. Never use face shields without wearing safety glasses or goggles underneath the shield.
- Welding goggles or helmets shall be worn with the appropriate filter lens when performing welding operations or when receiving direct exposure to welding flashes. Refer to the Welding and Cutting SOP, HSE 314, for the appropriate filter lens.

5.6.2 Head Protection

Approved protective headwear or hard hats are rigid head gear of varying materials designed to protect the worker's head not only from impact but also from flying particles, electric shock, or any combination of the three. Metal or light plastic "bump caps" are not approved to be used in lieu of hard hats.

- Hard hats are selected based on protection from impact or penetration to the head, and for potential contact with electrical hazards. Hard hats meeting country-specific regulatory requirements must be used. For example, OSHA requires hard hats must meet ANSI Z89.1 criteria. Hard hat types include the following:
 - Type 1 helmets are intended to reduce the force of impact resulting from a blow only to the top of the head.
 - Type 2 helmets are intended to reduce the force of impact resulting from a blow which may be received off center or to the top of the head.
 - Class G (General) helmets are intended to reduce the danger of contact exposure to low-voltage conductors. Test samples are proof-tested at 2,200 volts (phase to

ground). However, this voltage is not intended as an indication of the voltage at which the helmet protects the wearer.

- Class E (Electrical) helmets are intended to reduce the danger of exposure to high-voltage conductors. Test samples are proof-tested at 20,000 volts (phase to ground). However, this voltage is not intended as an indication of the voltage at which the helmet protects the wearer.
- Class C (Conductive) helmets are not intended to provide protection against contact with electrical conductors.
- Unless allowed by the manufacturer, hard hats must be worn with the bill of the helmet facing forward, with the suspensions properly attached, and kept a minimum of 1.25 inches below the inside of the hard hat. To ensure adequate suspension clearance, never carry objects inside the hard hat.
- Ensure hard hats are not worn over caps. A hard hat liner for work in a cold environment (winter), intended to be attached inside the helmet, is to be used.
- Always inspect the hard hat before each use for cracks, signs of impact, or other signs of wear that might reduce its structural integrity. Hard hats showing signs of damage must not be worn. Suspensions should be inspected for loose or torn cradle straps, broken sewing lines, loose rivets and other defects. Suspensions must be replaced when damage is found.
- Follow the manufacturer's instructions and precautions for cleaning the hard hat, as some solvents can damage the helmet's plastic shell. Never paint the hard hat and follow manufacturer restrictions for applying stickers or decals to avoid reducing the dielectric properties or avoid attack and softening of the shell material.
- Follow manufacturers' suggested replacement guidelines for all hard hats. Generally, manufacturer's recommend replacing their hard hat 5 years after assignment. Employees assigned personal hard hats shall be responsible for ensuring that hard hats are replaced if damaged in any way and if they have had the hard hat for 5 or more years without obvious damage.

5.6.3 Foot Protection

Standard safety-toed shoes or boots are required where foot hazards are present, such as falling or rolling objects or objects that could pierce the sole, and for protection from electrical or chemical hazards.

- Foot protection must meet compression and impact resistance required by the country-specific regulation. For example, OSHA requires foot protection meet ANSI Z41.1.
- Toe reinforcement and sole shanks of protective footwear are often made of steel. Kevlar may be substituted for steel toes or sole shanks for wear in cold environments and when conducting certain geophysical activities.
- Electric shock-resistant footwear, meeting the requirement of ASTM F 2413-05, must be worn when working to protect employees when working around exposed electrical

equipment to protect the wearer when unintentional contact is made with live electrical wires.

- Specific synthetic-material boots or protective shoe covers for leather boots/shoes may be required when working around hazardous chemicals. Select boots or shoe covers based on information provided in the material safety data sheet (MSDS) or manufacturer's specifications.
- In work areas with potential protrusion hazards that could cause ankle injuries, boots should be worn covering at least the ankle, preferably to the mid-calf level.

5.6.4 Hand Protection

Gloves are required to protect the hands from severe cuts or abrasions, punctures, skin absorption of harmful substances, chemical burns, thermal burns, and harmful temperature extremes.

Hand protection selection depends on the chemical or physical hazard, required dexterity, and anticipated exposure duration. Guidelines for glove selection include the following:

- Only wear properly sized gloves. Gloves too small can fatigue the hands, while gloves too large reduce dexterity and can lead to mishandling objects that can lead to incidents or injuries.
- Inspect gloves before each use for rips, abrasions, holes and other deformities. Defective gloves must not be used and discarded.
- Leather gloves protect against sparks, rough surfaces, and scraping objects. Metal mesh and other cut-resistant gloves protect hands from knives, blades, and other sharp objects.
- Electrical insulating gloves and sleeves are classified for the level of protection from electrical shock based on the type of current (i.e., ac or dc) and voltage. These gloves must be periodically tested to ensure the insulating properties are maintained. Leather gloves should be worn over electrical insulating gloves to protect them from tears or punctures.
- Chemical protective gloves are selected for specific or general categories of chemicals based upon information provided by the manufacturer's chemical resistance and physical performance specifications for protection from puncture, degradation, breakthrough, and permeation rates. Gloves should be taped at the top or folded with a cuff to prevent liquids from running inside the glove.

5.6.5 Body Protection

Body protection includes chemical-protective clothing, flotation gear, fire-resistant coveralls, physical protection, and welding clothing. Body protection must be selected based on the hazard and properly sized to the employee to ensure it provides the desired protection without hindering movement or creating a hazard to the user. Follow manufacturer's guidelines for proper selection, use, and maintenance. Guidelines for body protection include the following:

- Chemical-protective clothing may be fully encapsulating or non-encapsulating, reusable or disposable.

- Vapor-tight, fully encapsulating body protection must be used to prevent skin absorption of a hazardous substance that may result in a substantial possibility of immediate death, immediate serious illness or injury, or impaired ability to escape. These fully encapsulating suits must be able to maintain positive pressure and prevent inward gas leakage. Specific inspection and testing procedures must meet regulatory requirements to ensure the integrity of the suit and that a vapor-tight seal is maintained
- Full-body suits are worn to prevent skin contact by chemicals. Selection is based on the extent of body protection required (i.e., head to foot, head and body, body and foot, or body only), the hazardous substance(s) the user will encounter, and the duration of the task to be completed compared to the suit's resistance to puncture or tearing, chemical degradation, breakthrough, and permeation from direct contact, splashing, or chemical airborne concentration.
- Aprons, leggings, or sleeve protectors can be used as an alternative to full-body protection when body-specific protection only is required.
- Personal flotation devices (PFD) are used to add buoyancy to personnel working around water. Select the PFD based on the types classified by the U.S. Coast Guard compared to the task performed on or near bodies of water. When hazardous chemicals are present, the flotation device should be protected from exposure to materials that could damage it.
- Flame-resistant clothing must be worn when working on electrical installations, welding, or in environments where there is a risk of fire or extremely high temperatures.
- Body protection for work on electrical installations is selected based on the degree of hazard matched to the arc-hazard rating of the garments.
- Welding body protection, typically made of leather, includes jackets, aprons, or sleeves and is selected based upon the degree of molten splatter or sparks that can contact the body.

5.7 Hot and Cold Environments

Protective equipment or garments for hot and cold environments will be provided based on a thermal stress risk assessment performed by the RHSM.

Cooling garments remove excess heat generated by worker activity or work-environment conditions. Body cooling garments for heat-stress prevention will be used based upon an assessment of the degree of exertion to complete the task, the work environment, and after consideration whether appropriate engineering controls or work rest regimens are appropriate.

Several types of cooling garments or devices are available, including:

- Cooling devices that circulate cool dry air throughout the garment
- Devices that circulate cool water or a high-heat-capacity gel through tubes to remove excess heat
- A vest with pockets for inserting packets of ice

Cold-weather clothing is provided to staff required to spend more than 50 percent of their time in the field when the temperature is below 30 degrees Fahrenheit. The style and thermal insulation rating of the cold weather gear is based on the type of work to be performed and the expected climatic conditions and temperature range. Cold weather gear can be issued to an employee and returned for use by another employee when it is cleaned and in good condition.

5.8 Subcontractor Oversight

Subcontractors are responsible and accountable for implementing PPE requirements and any additional requirements established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of their PPE program.

6.0 Training

Employees must receive training on how to properly wear, adjust, and maintain the PPE to be worn, including information on its limitations. Means to receive PPE training include the following:

- As part of the curriculum for OSHA 40-hour hazardous waste operations training or OSHA CH2M HILL 10-hour construction safety awareness course.
- CH2M HILL computer-based Field Awareness Safety Course or computer-based PPE training module; documentation of online PPE training will be maintained in the Hands database by the appropriate SPA.
- As part of initial project safety orientation or in project safety briefings and toolbox meetings.
- Retraining of the employee is required when the workplace changes, making the earlier training obsolete, the type of PPE changes or when the employee demonstrates lack of use, improper use, or insufficient skill or understanding.

7.0 Checklists

Attachment 2 contains a Self Assessment-PPE Checklist as a guideline for evaluating a project PPE program.

8.0 Attachments

Attachment 1: [EPA Levels of Protection Table](#)

Attachment 2: [Self-Assessment PPE Checklist](#)

9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	3/22/2007	Updated to Standard Operating Procedure	Jeff Stumpf; Sandy Wise	<i>R. Keith Christopher</i>
2	12/30/2008	Revised section 5.4, Acquiring PPE to clarify requirement for the company to ensure the adequacy, maintenance, and sanitation of employee-owned PPE. Revised 5.6.3 for clarification on requirements for electrical shock resistance footwear.	Jeff Stumpf	<i>R. Keith Christopher</i>

EPA Levels of Protection Table	
Level of Protection	Recommended PPE
A The highest respiratory, skin, and eye protection	<ul style="list-style-type: none">• Pressure-demand full-facepiece SCBA or SAR• Fully encapsulating vapor-tight chemical-resistant suit• Inner chemical-resistant gloves• Chemical-resistant safety boots• Disposable glove and boot covers• Coveralls• Long cotton underwear• Hard hat• Two-way radio communications• Cooling unit
B The same respiratory and eye protection as level A, but less skin protection	<ul style="list-style-type: none">• Pressure-demand full-facepiece SCBA or SAR• Fully encapsulating chemical-resistant suit• Inner and outer chemical-resistant gloves• Chemical-resistant safety boots• Disposable boot covers• Cooling unit• Coveralls• Long cotton underwear• Hard hat• Two-way radio communications• Cooling unit
C The same skin and eye protection as level B, but less respiratory protection	<ul style="list-style-type: none">• Full-facepiece APR• Chemical-resistant clothing• Inner chemical-resistant gloves• Chemical-resistant safety boots• Disposable boot covers• Coveralls• Long cotton underwear• Hard hat• Two-way radio communications
D No respiratory protection Minimal skin protection	<ul style="list-style-type: none">• Coveralls• Abrasion-resistant gloves• Safety boots• Disposable boot covers• Hard hat• Face shield• Escape mask

HSE Self-Assessment Checklist: PPERSONAL PROTECTIVE EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where CH2M HILL employees are required to wear PPE or are required to perform oversight of a subcontractor using PPE or both.

CH2M HILL staff shall not direct the means and methods of subcontractor use of PPE nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____		Project No.: _____	
Location: _____		PM: _____	
Auditor: _____		Title: _____ Date: _____	
This specific checklist has been completed to (check only one of the boxes below):			
<input type="checkbox"/> Evaluate CH2M HILL compliance with its PPE program (SOP HSE-117) <input type="checkbox"/> Evaluate a CH2M HILL subcontractor's compliance with its PPE program Subcontractor's Name: _____			
Check the appropriate box, as follows:			
<ul style="list-style-type: none"> • Check "Yes" if an assessment item is complete or correct. • Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No." • Check "N/A" if an item is not applicable. • Check "N/O" if an item is applicable but was not observed during the assessment. 			
Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-117.			
SECTION 1			
GENERAL			
1. Required PPE listed in HSP FSI or AHA.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. PPE available for use by employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. PPE cleaning supplies available for use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. PPE stored appropriately to prevent deformation or distortion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. PPE written certification has been completed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EYEWEAR (Glasses/Goggles/Face Shields)			
6. Eyewear cleaning supplies available.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Safety glasses in good condition and lenses free of scratches.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Goggles adjustment strap not cracked or frayed, not deformed, or lenses not scratched.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Face shields in good condition, including adjustment band, and free of scratches or chips.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 1 (Continued)	Yes	No	N/A	N/O
HEAD PROTECTION				
10. Hard hat bill and suspension attached as allowed by manufacturer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Shell is pliable, free of dents, cracks, nicks, or any damage due to impact.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Suspension maintained at 1.25 inches from inside of shell.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Suspension free of cuts or fraying, torn headband, adjustment strap workable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Electrical hard hat matched to hazard classification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Dated to determine whether within manufacturer's allowable 5-year use time period.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HAND PROTECTION				
16. Available in sizes matched to employee.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Gloves free of rips tears, abrasions, or holes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Matched to manufacturer's specification for chemicals used onsite.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Electrical gloves matched to hazard and periodically inspected for insulating rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BODY PROTECTION				
21. Available in sizes matched to employee.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Vapor-tight fully encapsulated suits tested at required periodic intervals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Flame-resistant clothing matched to electrical hazard and arc flash rating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Welding gear matched to degree of hazard and free of cuts, tears or burn holes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Flotation gear available for work near or on water and in good condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOT AND COLD BODY PROTECTION				
27. Cooling gear available based on degree of heat stress hazard.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Cooling gear in operable, clean, and sanitary condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Cold-weather gear provided based on needs assessment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Cold-weather gear available in sizes to match employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Cold-weather gear is in free of tears, rips, or holes and in maintained in a clean condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TRAINING				
32. Initial PPE training completed by employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Training conducted when new types or styles of PPE are issued.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. PPE selection, use, and maintenance reviewed at daily safety briefings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2

Complete this section for all items checked “No” in Section 1. Deficient items must be corrected in a timely manner.

[illegible]

Auditor: _____ Project Manager: _____



[Click here for attachments](#)

Respiratory Protection

Enterprise Standard Operating Procedure HSE-121

1.0 Purpose

This Enterprise HSE Standard Operating Procedure (SOP) describes the requirements with which CH2M HILL Legal Entities and Business Groups (BGs) must comply when implementing a respiratory protection program as a means to protect employees from exposure to airborne hazardous substances.

1.1 References

The following programs, regulations, and sources were consulted to prepare this Enterprise SOP:

- Assigned Protection Factors – Federal Register Number 71:60121-50192, U.S. Department of Labor, Final Rule, 29 CFR 1910, 1915, 1926
- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Amended Rule, 29 CFR 1910.134 and 29 CFR 1926.103, Respiratory Protection

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control occupational exposure to air contaminated with dusts, fibers, fogs, fumes, mists, smokes, sprays, gases, or vapors above permissible exposure limits by instituting feasible engineering control measures. Respiratory protection may only be used when engineering controls are not feasible, are ineffective in reducing exposure to an acceptable level, or while they are being instituted.

This SOP describes the administration of a respiratory protection program to meet the requirements of the OSHA Respiratory Protection standard, 29 CFR 1910.134. Respiratory protection requirements regulated for OSHA substance-specific standards (OSHA 1910 - Subpart Z) that include arsenic, asbestos, 1-3 butadiene, benzene, cadmium, ethylene oxide formaldehyde, lead, methylene chloride, and vinyl chloride describe the required respirator selection with assigned protection factors.

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL legal entities that operate in the United States (U.S.) and internationally when:

- CH2M HILL employees are required to wear respiratory protection. Respirators are provided to employees at no fee. Respiratory protection includes half-face and full-face air-purifying respirators (APR), powered air-purifying respirators (PAPR), supplied-air respirators (SAR), and self-contained breathing apparatus (SCBA). Some elements of this SOP may also apply to employees who voluntarily wear respiratory protection for comfort or nuisance protection or for the use of filtering facepiece respirators (i.e., dust masks).
- CH2M HILL provides oversight of subcontractors who are required to wear respiratory protection.

Where state OSHA agencies may have more stringent requirements, contact the appropriate responsible BG Health and Safety Manager to address these specific requirements.

For international operations, this SOP should be followed as a minimum requirement, but country-specific H&S regulations (i.e., Canada, Australia, or European Union countries) shall prevail, and an applicable SOP should be developed to comply with specific H&S regulations.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedures that are applicable to this Respiratory Protection SOP are as follows:

- [HSE SOP-501, Arsenic](#)
- [HSE SOP-502, Asbestos](#)
- [HSE SOP-503, Benzene](#)
- [HSE SOP-504, Cadmium](#)
- [HSE SOP-507, Formaldehyde](#)
- [HSE SOP-513, Hexavalent Chromium](#)
- [HSE SOP-508, Lead](#)
- [HSE SOP-113, Medical Surveillance](#)
- [HSE SOP-509, Methylene Chloride](#)
- [HSE SOP-512, Vinyl Chloride](#)

3.0 Definitions

3.1 Air-purifying respirator (APR)

A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

3.2 Assigned protection factor (APF)

The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified in this SOP.

3.3 Atmosphere-supplying respirator

A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and SCBA.

3.4 End-of-service-life indicator (ESLI)

A warning system that identifies the end of service life for cartridges and canisters.

3.5 Filtering facepiece (dust mask)

A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

3.6 Fit factor

A quantitative estimate that is the ratio of the concentration of a substance in ambient air to the concentration inside a particular respirator worn by a specific individual.

3.7 Hood/helmet

A rigid respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso that also provides head protection against impact and penetration.

3.8 High-efficiency particulate air (HEPA) filter

A filter that is at least 99.97 percent efficient in removing monodispersed particles of 0.3 micrometers in diameter.

3.9 Immediately dangerous to life or health (IDLH)

An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere; IDLH includes oxygen-deficient atmospheres (i.e., oxygen content less than 19.5 percent by volume).

3.10 Loose-fitting facepiece

A respiratory inlet covering that is designed to form a partial seal with the face.

3.11 Maximum use concentration (MUC)

The maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator. The MUC is determined by the respirator APF or class of respirators and the exposure limit of the hazardous substance.

3.12 Negative pressure respirator

A respirator in which the pressure inside the facepiece is less than the ambient air pressure outside the respirator; this includes APRs, SARs, and SCBAs operating in demand mode.

3.13 Positive pressure respirator

A respirator in which the pressure inside the facepiece exceeds the ambient air pressure outside the facepiece; this includes PAPRs, SARs, and SCBAs operating in pressure-demand mode.

3.14 Powered air-purifying respirator (PAPR)

An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the facepiece.

3.15 Qualitative fit test (QLFT)

An assessment of the adequacy of respirator fit by relying on the individual's response to a test agent (this is a pass or fail test).

3.16 Quantitative fit test (QNFT)

An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

3.17 Self-contained breathing apparatus (SCBA)

An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

3.18 Service life

The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

3.19 Supplied-air respirator (SAR)

An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user (also known as an airline respirator).

3.20 Tight-fitting facepiece

A respiratory facepiece that forms a complete seal with the face; this includes half-face and full-face respirators.

3.21 User seal check

An action conducted by the respirator user to determine if the respirator is properly seated to the face.

4.0 Roles and Responsibilities

The sections below list the roles and responsibilities required to implement CH2M HILL's respiratory protection program.

4.1 Business Group Health and Safety Lead

The BG H&S Leads are responsible for overseeing the implementation of the respiratory protection program for all projects in their BG. The BG H&S Leads have the authority to approve deviation from this SOP to accommodate requirements outside the United States.

4.2 Corporate Consulting Occupational Physician (CCOP)

The CCOP is responsible for reviewing medical evaluations and providing a written recommendation on an employee's ability to wear respiratory protection, reviewing additional information provided by employees regarding their ability to use respiratory protection, and making the necessary changes to written recommendations

4.3 Safety Program Assistant (SPA)

The SPA is responsible for scheduling medical evaluations; fit testing; training; maintaining records of medical evaluation and fit testing in the HSE HandS database; forwarding applicable medical evaluation and fit test documentation to the Occupational Health Management firm; and assisting project HS staff (Responsible Health and Safety Manager [RHSM] or Safety Coordinator [SC]) with obtaining appropriate respiratory protection.

4.4 Regional Equipment Specialist (RES)

The RES is responsible for shipping respirators to projects as requested by the SPA, RHSM, or SC; inspecting respirators before they are sent to projects; inspecting and repairing respirators upon their return; and documenting all inspections and repairs

4.5 Project Manager (PM)

The PM has overall H&S management responsibility but may delegate specific tasks to other project staff, such as the Site Manager (SM). The PM will provide the RHSM and SC with project-specific information to complete the respirator selection evaluation.

4.6 Site Manager (SM)

The CH2M HILL SM is responsible for onsite field operations and can be the Construction Manager (CM), Site Superintendent, Site Supervisor, or Field Team Leader. The SM implements all aspects of the project H&S plan as assigned by the PM.

4.7 Responsible Health and Safety Manager (RHSM)

The BG RHSM is assigned by the BG H&S Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the respiratory protection requirements in the CH2M HILL project H&S plan, reviews subcontractor H&S plans and submittals for respiratory protections, and conducts project H&S audits on the effectiveness of the respiratory protection program.

4.8 Safety Coordinator (SC)

The SC is either the SM or is designated by the SM to implement the project H&S Plan. The SC implements the requirements of the project respiratory protection program described in the project H&S plan and works with the RHSM to ensure its continued effectiveness.

4.9 CH2M HILL Employees

All CH2M HILL employees who use respiratory protection must meet the requirements necessary to properly use and maintain their respiratory protection by meeting the medical qualification, completing the required training, and following the prescribed procedures described in this SOP, the Health and Safety Plan (HSP), or Field Safety Instruction (FSI).

4.10 Enterprise HSE Respiratory Protection Program Administrator

The Enterprise HSE Respiratory Protection Program Administrator is responsible for evaluating the effectiveness of the respiratory protection requirements described in the SOP and making sure that appropriate action is taken to ensure its effectiveness.

5.0 Requirements

The following respiratory protection program requirements must be implemented for all employees of CH2M HILL legal entities and BGs who operate in the U.S. and internationally as a minimum requirement unless more stringent requirements exist in a country-specific regulation.

5.1 Written Program

The OSHA “Respiratory protection” standard (29 CFR 1910.134) requires employers to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. This SOP serves as the written respiratory protection program and is supplemented as needed by the project HSP or FSI. Voluntary use of respiratory protection by CH2M HILL employees is described in Attachment 1.

5.2 Respirator Medical Evaluation

Employees required to wear respiratory protection shall have a medical evaluation before the respirator fit test or before using a respirator when a fit testing is not required. Medical evaluation is required when an employee voluntarily uses a negative-pressure APR. Medical evaluation is not required when an employee voluntarily uses a filtering facepiece respirator (dust mask).

The complete respirator medical evaluation protocol may be found in HSE SOP 113, “Medical Monitoring.”

Employees must contact the RHSM if they experience any medical signs or symptoms that may be related to their ability to use a respirator or if changes in the workplace result in a substantial increase in the physiological burden placed on the employee. The RHSM will inform the CCOP to ensure that the necessary changes to the written recommendation are made.

5.3 Respirator Fit Testing

Employees using a tight-fitting respirator facepiece (negative or positive pressure) shall pass an appropriate fit test before initial use and annually thereafter. Fit testing is not required when an employee voluntarily uses a filtering facepiece respirator (dust mask).

Employees must contact the appropriate SPA to schedule a respirator fit test before initial respirator use, annually, and when additional fit testing is required. Only individuals trained in fit testing protocols shall be allowed to perform respirator fit testing. All fit test records shall be sent to and maintained by the appropriate SPA.

The fit test shall be conducted using the same size, style, and model of respirator facepiece that will actually be used by the employee. Qualitative (QLFT) or quantitative (QNFT) fit tests shall be administered using protocol listed in Attachment 3.

Additional fit testing shall be conducted for the following reasons:

- Changes occur in the employee's physical condition that could affect the fit of the facepiece (that is, facial scarring, cosmetic surgery, dental changes, or an obvious change in body weight).
- The facepiece to be worn is different in size, style, or model, than the facepiece used during the fit test.
- After passing a fit test, the employee determines the facepiece fit to be unacceptable.

5.4 Respirator Selection

A selection guideline is provided in Attachment 4 to assist the RHSM in determining the appropriate respiratory protection. The RHSM shall identify the selected respiratory protection, including limitations such as the Assigned Protection Factor (APF) and MUC for their use in the HSP or FSI.

If an APR without an ESLI will be used, the RHSM shall develop a cartridge and canister change-out schedule using the guidelines provided in Attachment 5 and provide this schedule in the HSP or FSI.

Respiratory protection can be obtained from the CH2M HILL RES with assistance from the SPA, SC, or RHSM or purchased through a respiratory protection vendor with the approval from RHSM.

5.5 Respirator Use

Only respirators identified in the project-specific HSP or FSI shall be used. The SC must routinely evaluate employee respirator use for proper use and effectiveness, and notify the RHSM of any change from the expected site conditions that may alter the performance and reliability of the selected respiratory protection. The RHSM shall make appropriate changes to the selection process. Some examples of changes in site conditions that may affect respiratory protection selection include the following:

- Exposure to additional contaminants
- Higher than expected exposure levels
- Engineering controls not as efficient as expected
- Changes in environmental conditions (e.g., temperature and humidity) and work practice (e.g., higher work load demand)
- Respirator user comments or complaints on respirator effectiveness

No respirator user with a tight-fitting respirator facepiece shall have facial hair or any other condition that interferes with the facepiece seal, such as corrective glasses, goggles, or other personal protective equipment. The user shall perform a user seal check, as outlined in Attachment 6, before each use.

Prescription glass inserts may be used for fullface respirators. The RES or approved vendor supplies the spectacle kit and an optometrist supplies the appropriate lenses.

Contact lenses may be worn with respiratory protection, provided they do not interfere with respirator function or create a hazard to the employee's vision.

Respirator cartridges and canisters shall be labeled and color coded with a National Institute for Occupational Safety and Health (NIOSH) approval label; this label shall not be removed or made illegible. The SC shall verify that cartridges and canisters are replaced according to the change-out schedule provided in the project-specific HSP or FSI. Respirator users shall notify the SC of any detection of vapor or gas breakthrough. The SC shall report any breakthrough events to the RHSM for schedule upgrade.

Employees shall be allowed to leave the respirator use area for the following reasons:

- To wash their face and respirator facepiece as necessary to prevent eye or skin irritation
- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece
- To replace the respirator filter, cartridge, or canister elements

In IDLH atmospheres, at least one employee shall be located outside the IDLH area (i.e., the standby person). The standby person shall be responsible for the following:

- Maintaining communication with the employee inside the IDLH area
- Having sufficient training to provide effective emergency rescue
- Having the necessary retrieval equipment and an SCBA or positive-pressure SAR with auxiliary self-contained air supply
- Notifying the SC before entering the IDLH area for rescue purposes

5.6 Respirator Inspection

Respirators supplied by the RES shall be inspected before being sent to the field. Respirators received from a respiratory protection vendor shall be inspected by the SC before being issued to the employee. Each user shall inspect his or her respirator before each use and during cleaning.

Emergency response respirators shall be inspected monthly by the SC and checked for proper function before and after each use. Documentation of the monthly inspection shall be kept with the emergency respirators.

Respirators found to be defective during the inspection shall be taken out of service or repaired, as described in Section 5.9.

Inspection procedures for the different types of respiratory protection are outlined in Attachment 7.

5.7 Respirator Cleaning and Disinfecting

Respirators regularly used shall be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition. Emergency respirators and respirators that will be used by other employees shall be cleaned and disinfected after every use. Procedures for cleaning and disinfecting respirators are described in Attachment 8.

5.8 Respirator Storage

Respirators shall be properly stored to protect against contamination, dust, extreme temperatures, excessive moisture, damaging chemicals, and direct sunlight. They shall be packed or stored to prevent deformation of the facepiece and exhalation valve. Respirators should be stored in their original carton or carrying case.

Respirators stored for emergency use must be accessible to the work area. Compartments must be clearly marked indicating that emergency respirators are inside.

5.9 Respirator Repairs and Maintenance

Respirators found to be defective during inspection, user seal check, cleaning, or operation must be removed from service until repaired.

Repairs and maintenance of respirators beyond regular cleaning and other routine tasks, such as replacement of worn straps, exhalation and inhalation valves, and lens covers, must be performed by an individual certified by the manufacturer.

Respirator users shall notify the SC of respirators that are defective beyond routine repair. The SC shall initiate non-routine repairs by sending the respirator to the CH2M HILL RES or to an individual certified by the respirator manufacturer. The RES shall ensure respirators are properly repaired and inspected before reuse. Repairs not carried out by the manufacturer or by a factory-certified RES will generally void the respirator's NIOSH approval.

5.10 Respirator Breathing Air Quality and Use

The SC or RHSM will ensure the requirements for acceptable respirator breathing air quality are met.

Compressed breathing air used with SCBA or SAR shall meet or exceed the Compressed Gas Association requirements for Grade D air. Grade D air specifications include the following:

- Oxygen content of 19.5 to 23.5 percent by volume
- Condensed hydrocarbons of 5 milligrams per cubic meter (mg/m³) or less
- Carbon monoxide (CO) content of 10 parts per million (ppm) or less
- Carbon dioxide (CO₂) content of 1,000 ppm or less

- Lack of noticeable odor

Respirator air-line couplings must be **incompatible** with outlets for other gas systems to prevent inadvertent servicing of air-line respirators with non-respirable gases or oxygen.

Compressed or liquid oxygen shall not be used with SCBA or SAR.

5.10.1 Breathing Air Supplied by Cylinders

The cylinder shall be marked with a NIOSH approval label. Breathing air cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178).

The supplier of breathing air cylinders shall provide a certificate of analysis stating that the air meets Grade D air requirements and has a moisture content that does not exceed a dew point of -50° F at 1 atmosphere pressure. The SC shall verify that the certificate of analysis meets Grade D air requirements and that the certificate is kept onsite.

5.10.2 Breathing Air Supplied by Compressor

Breathing air supplied by compressors shall meet Grade D air requirements and minimize moisture content so that the dew point at 1 atmosphere pressure is 10° F below ambient temperature. Compressors shall be constructed and maintained as follows:

- The compressor intake shall be located in a manner that prevents contaminated air from entering the air-supply system. The intake shall be located away from combustion exhaust gases from nearby vehicles or the compressor itself, or by other exhaust gases ventilated from plant processes.
- The compressor shall be provided with suitable in-line air-purifying sorbent beds or filters to further ensure breathing air quality. Sorbent beds or filters shall be maintained and replaced following the compressor manufacturer's instructions.
- A tag shall be maintained on the compressor indicating the most recent sorbent bed or filter change date and the signature of the person that performed the change.

Oil-lubricated compressors shall be provided with a high-temperature or CO alarm, or both, to monitor CO levels. If a high-temperature alarm alone is used, the air supply shall be monitored at intervals sufficient to prevent CO in the breathing air from exceeding 10 ppm. If a CO alarm is used, the alarm shall be loud enough to alert the breathing air users or another person who knows to alert any users.

Non-oil-lubricated compressors do not require a high-temperature or CO alarm. However, the compressor user shall take practical measures to ensure that CO levels in the breathing air do not exceed 10 ppm. These measures include placing the air intake for the compressor in an area that is free from contaminants, monitoring frequently or continuously for CO in the breathing air supply, using CO filters, or using a high-temperature alarm or shut off device.

5.11 Subcontractor Management

Subcontractors are responsible and accountable for implementing a respiratory protection program established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of their respiratory protection program.

The "Subcontractor Safety Procedure Criteria – Respiratory Protection" described in Attachment 9 provides the minimum criteria for respiratory protection use. These criteria may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor's operations.

6.0 Training Requirements

Employees required to wear respiratory protection shall successfully complete appropriate respirator training before initial respirator use, and annually thereafter. Respiratory protection training is categorized in two levels: Level C, which includes the APR and PAPR; and Level B, which includes SAR and SCBA.

Retraining shall be provided when:

- Changes in the workplace or type of respirator used render previous training obsolete
- The user has not retained the necessary knowledge or understanding of how to properly use respiratory protection

The SC shall ensure that employees who voluntarily use respiratory protection read "Information for Voluntary Use of Respirators" (Attachment 1).

Subcontractors are responsible for ensuring they comply with all applicable respiratory protections training requirements and for providing the training necessary to complete their tasks safely.

6.1 Level C Respirator Training

APR training is an integral part of the initial 40-hour and annual 8-hour refresher hazardous waste training programs. Employees enrolled in the CH2M HILL comprehensive program are in compliance with APR training requirements.

Employees using APR who are not enrolled in the comprehensive program are required to complete CH2M HILL's Level C Respiratory Safety training module on the HSE web site.

Employees using PAPR should contact their RHSM to receive specific PAPR training.

6.2 Level B Respirator Training

Employees using SAR or SCBA are required to complete CH2M HILL's Level B Respiratory Safety training module and contact their SPA to set up required hands-on training. Hands-on training specific to the respirator type to be used shall be provided by the SC or RHSM.

7.0 Assessment Requirements

CH2M HILL's respiratory protection program shall be evaluated by the SC during HS&E self-assessments and by the RHSM during HS&E field audits.

Attachment 2 is the Respiratory Protection self-assessment checklist used to verify program implementation. This checklist shall be completed by the SC at least once during use of respiratory protection by CH2M HILL personnel. Any deficiencies noted during the self-assessment shall be brought to the attention of the RHSM.

The RHSM completing an HS&E field audit for a project where employees are required to use respiratory protection will interview respirator users to obtain their views on the effectiveness of the written program and to identify any concerns. Factors to be assessed during the audit include the following:

- Are respirators properly fitted?
- Is respirator use interfering with effective workplace performance?
- Are appropriate respirators correctly selected for the hazards encountered?
- Are respirators being worn when necessary?
- Are respirators being used and maintained properly?

Correcting any deficiencies identified during the HS&E field audit shall be the responsibility of the PM or SM with the technical assistance of the RHSM or SC. The HS&E BG Lead must be advised of any issues in correcting noted deficiencies that require resolution or of any complaints or concerns raised by individual employee so appropriate action can be taken to ensure the effectiveness of the respiratory protection program.

8.0 Recordkeeping

The respiratory protection program recordkeeping requirements and the responsible entity for maintaining the documentation are listed below:

- Documentation of employee medical evaluation and fitness to wear respiratory protection shall be maintained by the Occupational Health Management Firm. The record of the respirator medical evaluation will be entered into the CH2M HILL HandS database and maintained by the appropriate SPA.
- Documentation of respirator fit-tests and entry of the results of the current fit-test into the HandS database will be maintained by the appropriate SPA.
- Documentation of respirator training will be maintained in the HandS database by the appropriate SPA.

9.0 Attachments

Attachment 1: [Information for Voluntary Use of Respirators](#)

- Attachment 2: [H&S Self-Assessment Checklist-Respiratory Protection](#)
- Attachment 3: [Qualitative and Quantitative Fit Testing Protocols](#)
- Attachment 4: [Respirator Selection Guideline](#)
- Attachment 5: [Cartridge and Canister Change-Out Schedule Guideline](#)
- Attachment 6: [Respirator User Seal Check Procedure](#)
- Attachment 7: [Respirator Inspection Procedures](#)
- Attachment 8: [Respirator Cleaning and Disinfecting Procedures](#)
- Attachment 9: [Subcontractor Safety Procedure Criteria – Respiratory Protection](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	2/27/2007	Updated to Standard Operating Procedure Updated to include APF and MUC	Jeff Stumpf	<i>R. Keith Christopher</i>



Attachment 1: Information for Voluntary Use of Respirators

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take the following precautions to be sure that the respirator itself does not present a hazard.

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. This label will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants that your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not use someone else's respirator by mistake.



Attachment 2: HS&E Self-Assessment Checklist— Respiratory Protection

Respiratory Protection**Standard Operating Procedure HSE-121****H&S Self-Assessment Checklist: RESPIRATORY PROTECTION**

Page 1 of 3

This checklist is provided as a method of verifying compliance with the OSHA respiratory protection standard. It shall be used at locations where CH2M HILL personnel are using respiratory protection, or as a tool to assess subcontractors when CH2M HILL is required to perform oversight of a subcontractor using respiratory protection.

CH2M HILL staff shall not direct the means and methods of subcontractor use of respiratory protection nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Items considered to be imminently dangerous (i.e., possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Completed checklists must be sent to the Responsible Health and Safety Manager (RHSM) for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

☐ Evaluate CH2M HILL compliance with its respiratory protection program (SOP HSE-121)

☐ Evaluate a CH2M HILL subcontractor's respiratory protection program

Subcontractor's Name: _____

Check the appropriate box, as follows:

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-121.

SECTION 1**Yes No N/A N/O****TRAINING (6.0)**

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Respirator users have completed appropriate training on the respirator to be used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Training is current within the past 12 months. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Attachment 1 of SOP HSE-121 distributed to employees using respirators voluntarily. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

MEDICAL EVALUATION (5.2)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. Respirator users completed medical evaluation protocol. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Respirator use does not exceed any physician's written recommendation limitations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Respirator users know to report any medical signs or symptoms related to respirator use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

FIT TESTING (5.3)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 7. Respirator users of tight-fitting facepieces have passed a fit test. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Fit test is current within the past 12 months. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Respirator users know to have new fit test performed if any change affects respirator fit. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 1 (Continued)	Yes	No	N/A	N/O
RESPIRATOR SELECTION (5.4)				
10. All feasible engineering controls have been considered in reducing exposure levels.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Appropriate respiratory protection and limitations are specified in HSP/FSI.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Cartridge or canister change-out schedule is specified in HSP/FSI.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATOR USE (5.5)				
13. Respirator uses are limited to those specified in HSP/FSI.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. HSM notified of changes in site conditions that may alter effectiveness of specified respirators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Respirator users of tight-fitting facepieces are cleanly shaven.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Respirator users of tight-fitting facepieces perform user seal check before each use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Cartridges or canisters replaced according to change-out schedule in HSP/FSI.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Respirator users informed to report any gas or vapor breakthrough to SSC/RHSM.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. SC reports any gas or vapor breakthrough to RHSM.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Personnel not entering IDLH areas until standby-person established with appropriate equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATOR INSPECTION (5.6)				
21. Respirators in regular use are inspected before each use and during cleaning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Emergency response respirators are inspected and documented monthly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Defective respirators are taken out of service or repaired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATOR CLEANING AND DISINFECTING (5.7)				
23. Respirators in regular use are cleaned and disinfected as necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Emergency and transferred respirators are cleaned and disinfected after use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATOR STORAGE (5.8)				
25. Respirators are properly stored to prevent contamination and deformation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Emergency respirators are accessible and clearly marked as emergency respirators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATOR REPAIRS (5.9)				
27. Respirator repair is limited to routine maintenance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Respirators beyond routine repair are removed from service.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BREATHING AIR SUPPLIED BY CYLINDER (5.10.1)				
29. Cylinders are marked with NIOSH-approval label.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Certificate of analysis meets Grade D specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Certificate of analysis is kept onsite.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BREATHING AIR SUPPLIED BY COMPRESSOR (5.10.2)				
32. Breathing air meets Grade D specifications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Compressor intake is located away from exhaust gases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Compressor is provided with sorbent filters.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Sorbent filter change-out documentation is kept on the compressor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. High-temperature or carbon monoxide alarm provided on oil-lubricated compressors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. If high-temperature alarm is used alone, carbon monoxide levels are monitored.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Practical measures taken to control carbon monoxide levels on non oil-lubricated compressors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Complete this section for all items checked “No” in Section 1. Deficient items must be corrected in a timely manner.

Auditor: _____ Project Manager: _____

Attachment 3: Qualitative and Quantitative Fit Testing Protocols

The following protocols provide the guidance to individuals conducting respirator fit tests. Only individuals trained in fit testing protocols (i.e., fit testers) shall be permitted to perform respirator fit testing. Individuals being fit tested (i.e., test subjects) shall follow all instructions provided by the fit tester. These protocols are mandated by the Occupational Safety and Health Administration (OSHA) Respiratory Protection standard (29 CFR.1910.134) and any deviation shall void test results.

1.0 General Requirements

Respirator fit testing is required for tight-fitting respirator facepieces and must be done as follows:

- Before initial respirator use
- Annually
- When there are changes in an employee's physical condition that could affect the fit of the facepiece (that is, facial scarring, cosmetic surgery, dental changes, or an obvious change in body weight)
- When the facepiece to be worn is different in size, style, or model than the facepiece used during a fit test
- After passing a fit test, an employee determines the facepiece fit to be unacceptable

Fit testing is not required for the use of a filtering facepiece respirator (dust mask).

The fit tester shall verify that a medical evaluation has been conducted and a written recommendation has been received from the Corporate Consulting Occupational Physician. Fit testing shall only be performed for respirators the Corporate Consulting Occupational Physician has approved for use.

A qualitative fit test (QLFT) may be used for all positive-pressure respirators and for negative-pressure air-purifying respirators (APR) that must have a protection factor of 10 or less. Positive-pressure respirators shall be fit tested in the negative-pressure mode.

A quantitative fit test (QNFT) shall be used for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) used in negative-pressure mode (demand mode) and full-face APR that require a protection factor greater than 10.

2.0 Choosing a Respirator

1. Provide a sufficient number of respirator models and sizes to allow the test subject to pick a respirator that is comfortable and fits correctly. The fit test shall be conducted using the same size, style, and model of respirator facepiece that will be used in the field by the test subject.

2. Instruct the test subject on how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the test subject in evaluating the fit and positioning of the respirator.
3. Inform the test subject that he or she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. Instruct the test subject to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces shall be noted in case the one selected proves unacceptable; the most comfortable mask shall be donned and worn at least 5 minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in Item 6 (below). If the test subject is not familiar with using a particular respirator, the test subject shall don the mask several times and adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject, allowing the test subject adequate time to determine the comfort of the respirator:
 - Position of the mask on the nose
 - Room for eye protection
 - Room to talk
 - Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
 - Chin properly placed
 - Adequate strap tension, not overly tightened
 - Fit across nose bridge
 - Respirator of proper size to span distance from nose to chin
 - Tendency of respirator to slip
 - Self-observation in mirror to evaluate fit and respirator position
8. A fit test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns that cross the respirator sealing surface. Any type of apparel that interferes with a satisfactory fit shall be altered or removed.
9. If a test subject exhibits difficulty in breathing during the tests, he or she shall be referred to the Corporate Consulting Occupational Physician to determine whether this test subject can wear a respirator while performing his or her duties.
10. If the test subject finds the fit of the respirator unacceptable, he or she shall be given the opportunity to select a different respirator and to be re-tested.
11. Prior to the fit test, the test subject shall be given a description of the fit test and his or her responsibilities during the test protocol. The description of the process shall include a

description of the test exercises that the test subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

12. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use that could interfere with respirator fit.

3.0 Test Exercises

Each of the following test exercises shall be performed for 1 minute, except for the grimace exercise, which shall be performed for 15 seconds. Question the test subject with regard to the comfort of the respirator upon completion of the test exercises.

1. **Normal breathing.** In a normal standing position, without talking, the subject shall breathe normally.
2. **Deep breathing.** In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
3. **Turning head side to side.** Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
4. **Moving head up and down.** Standing in place, the subject shall slowly move his or her head up and down. The subject shall be instructed to inhale in the up position (that is, when looking toward the ceiling).
5. **Talking.** The test subject shall read the following passage slowly and loudly enough so as to be heard clearly by the fir tester:

“When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.”
6. **Grimace.** The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT).
7. **Bending over.** The test subject shall bend at the waist as if the test subject were to touch his or her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.
8. **Normal breathing.** Same as Exercise 1, above.

4.0 Isoamyl Acetate Qualitative Fit Test (QLFT) Protocol

4.1 Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the test subject can detect the odor of isoamyl acetate (IAA), also known as isopentyl acetate, at low levels. The test is performed in the following way:

1. Three 1 liter glass jars with metal lids are required.
2. Odor-free water (i.e., distilled or spring water) shall be used for the solutions.
3. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the screening test is performed, in order to prevent olfactory fatigue in the subject.
4. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.
5. Prepare a stock solution of IAA by adding 1 milliliter (ml) of pure IAA to 800 ml of odor-free water in a 1-liter jar, closing the lid, and shaking for 30 seconds. A new solution shall be prepared at least weekly.
6. Prepare an odor test solution in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for 2 to 3 minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only 1 day.
7. Prepare a test blank in a third jar by adding 500 ml of odor-free water.
8. Label the odor test and test blank jar lids for jar identification (i.e., 1 and 2). Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.
9. Place the following instructions on the table in front of the two test jars:

“The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the fit tester which bottle contains banana oil.”
10. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.
11. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to IAA fit testing.

4.2 Fit Test

1. The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot-diameter frame so that the top of the chamber is about 6 inches above the test

subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

2. Verify that each respirator used for the fitting and fit testing is equipped with organic vapor cartridges.
3. After the test subject has donned and properly adjusted the respirator, instruct the test subject to perform a user seal check, as described in Attachment 6 of the CH2M HILL's Respiratory Protection Program (HSE-121). If the test subject cannot pass a user seal check, a different respirator size or model shall be tried. If the fit becomes unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.
4. Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. Instruct the test subject to hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.
5. Allow 2 minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of their cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.
6. Instruct the test subject to perform the test exercises as identified in Section 3.0 of this attachment. A copy of the test exercises shall be provided or taped to the inside of the test chamber.
7. If at any time during the test, the test subject detects the banana-like odor of IAA, the test is failed. The test subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
8. If the test is failed, the test subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test protocol (1) through (7) above. The process continues until a respirator that fits well has been found. Should the test subject fail the odor sensitivity test, they shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.
9. If the test subject passes the test, the efficiency of the test protocol shall be demonstrated by having the test subject break the respirator face seal and take a breath before exiting the chamber.
10. Instruct the test subject to remove the saturated towel so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealed plastic bag to keep the test area from being contaminated.
11. Complete the Qualitative Respirator Fit Test Worksheet, provided at the end of this attachment, and send to the Safety Program Assistant (SPA) for retention.

5.0 Irritant Smoke (Stannic Chloride) Qualitative Fit Test (QLFT) Protocol

5.1 General Requirements and Precautions

1. Verify the respirator to be tested is equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
2. Only stannic chloride smoke tubes shall be used for this protocol.
3. No form of test enclosure or hood for the test subject shall be used.
4. The smoke can be irritating to the eyes, lungs, and nasal passages. Take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. When performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke, care shall be taken to use only the minimum amount of smoke necessary to elicit a response from the test subject.
5. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the fit tester or the build-up of irritant smoke in the general atmosphere.

5.2 Sensitivity Screening Check

The test subject must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

1. Break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. Cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
2. Advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the test subject to keep his or her eyes closed while the test is performed.
3. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if they can detect the irritating properties of the smoke. Carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he or she can detect it. If the test subject is unable of detecting the irritant smoke, this fit test protocol may not be used.

5.3 Fit Test Protocol

1. After the test subject has donned and properly adjusted the respirator, instruct the test subject to perform a user seal check, as described in Attachment 6 of CH2M HILL's Respiratory Protection Program (HSE-121). If a user seal check cannot be passed, a different respirator size or model shall be tried. If it fit becomes unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.
2. Instruct the test subject to keep his or her eyes closed.

3. Direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low-flow pump or the squeeze bulb. Begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. Gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.
4. If the test subject has not had an involuntary response or detected the irritant smoke, proceed with the test exercises. Instead of having the test subject read the “rainbow passage” in Step 5, instruct the test subject to talk for 1 minute.
5. Instruct the test subject to perform the test exercises identified in Section 3.0 of this attachment while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of 6 inches.
6. If the test subject detects the irritant smoke at any time, the test is failed. Test subjects being re-tested must repeat the entire sensitivity check and fit test protocol.
7. Each test subject passing the irritant smoke test without evidence of a response (e.g., involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test once the respirator has been removed, to determine whether he or she still reacts to the smoke. Failure to evoke a response shall void the fit test.
8. If a response is produced during this second sensitivity check, then the fit test is passed.
9. Complete the Qualitative Respirator Fit Test Worksheet, provided at the end of this attachment, and send to the Safety Program Assistant (SPA) for retention.

6.0 Portacount Quantitative Fit Test (QNFT) Protocol

1. A probed respirator is required for each make, style, model, and size that the test subject may use.
2. Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a high-efficiency particulate air (HEPA) or P100 series filter(s).
3. Instruct the test subject to don the respirator for 5 minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the test subject to make certain the respirator is comfortable.
4. Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; and self-observation in a mirror to evaluate fit and respirator position.
5. Instruct the test subject to perform a user seal check, as described in Attachment 6 of CH2M HILL’s Respiratory Protection Program (HSE-121). If a user seal check cannot be passed, a different respirator size or model shall be tried. If its fit becomes unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

6. Follow the Portacount operating instructions as presented in the Portacount training and proceed with the test.
7. Instruct the test subject to perform the test exercises in Section 3.0 of this attachment.
8. After the test exercises, question the test subject regarding the comfort of the respirator. If the fit has become unacceptable, another model of respirator shall be tried.
9. The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what determines the success of the fit test. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
10. Since the pass or fail criteria of the Portacount are user programmable, verify that the pass or fail criteria meet the requirements for minimum respirator performance. A minimum fit factor pass level of at least 100 is necessary for a half-face respirator and a minimum fit factor pass level of at least 500 is required for a full-face respirator.
11. Print a record of the fit test and send to the SPA for retention.



QUALITATIVE RESPIRATOR FIT TEST WORKSHEET

EMPLOYEE INFORMATION	
Test Subject's Name:	Employee #:
Office:	Region:

FIT TEST INFORMATION	
Type of Fit Test <input type="checkbox"/> Initial <input type="checkbox"/> Annual <input type="checkbox"/> Additional	Fit Test Protocol Used <input type="checkbox"/> Isoamyl Acetate <input type="checkbox"/> Irritant Smoke

RESPIRATOR INFORMATION			TEST RESULTS
Full Face Respirator			
<input type="checkbox"/>	MSA Ultratwin – Silicone	<input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL
<input type="checkbox"/>	MSA Ultratwin – Hycar	<input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL
<input type="checkbox"/>	MSA Advantage 1000	<input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL
<input type="checkbox"/>	Survivair	<input type="checkbox"/> Small <input type="checkbox"/> Medium/Large	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL
Half Face Respirator			
<input type="checkbox"/>	MSA COMFO	<input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL

Comments:

I (fit tester) certify that the above named individual has been qualitatively respirator fit tested in accordance with OSHA fit testing protocols (29 CFR 1910.134) and that the above information reflects the results of the test.

Fit Tester's Signature:	Employee #:	Date:
Test Subject's Signature:	Employee #:	Date:

Attachment 4: Respirator Selection Guideline

The selection of appropriate respiratory protection for field activities is a process based on numerous variables. This guideline is provided to assist the Responsible Health Safety Manager (RHSM) in selecting appropriate respiratory protection.

1.0 General Selection Procedure

The following steps shall be taken by the RHSM in selecting appropriate respiratory protection:

1. Identify hazardous airborne contaminants
2. Estimate exposure levels
3. Consider workplace and user factors
4. Select appropriate respiratory protection

2.0 Identifying Hazardous Airborne Contaminants

The RHSM shall use all available information in identifying potential hazardous airborne contaminants. This includes using information provided on the Field Project Start-Up Form (FPSF) and reviewing site conditions with the Project Manager (PM) and Site Safety Coordinator (SSC). The RHSM shall determine the contaminant's physical and chemical state. The physical form refers to if the air contaminant is a gas, vapor, mist, fume, dust, fiber, biological hazard, radiological hazard, or some combination, and may dictate which filter element will offer adequate protection. The chemical state refers to the contaminants valence state. For example, chromium must be identified by its valence state (i.e., chemical compound) since chromium VI compounds have much lower exposure limits than chromium metal, chromium II, or chromium III compounds.

3.0 Estimate Exposure Levels

After the potential airborne contaminants and nature of the hazards have been identified, the RHSM shall evaluate the potential exposure levels using one or more of the following methods:

- Personal air sampling is the most reliable and accurate method of determining exposure levels. Some OSHA substance-specific standards require air sampling.
- Area sampling or short duration sampling can provide a reasonable estimate of exposure; however, measurements must be taken during worst-case conditions.
- Objective data may include previous exposure measurements, data obtained from industry studies, trade associations, or from product manufacturers. The objective data must represent the highest exposure likely to occur under reasonably foreseeable conditions. To make estimates from objective data, the measurements must have been taken from conditions that are similar to those in the workplace.

-
- Mathematical modeling data from the physical and chemical properties of the contaminant combined with room (i.e., workplace) dimensions, air exchange rates, release rates, exposure patterns, work practice, and other pertinent data may be used to estimate the maximum anticipated exposure levels. This method should be limited to situations where the workplace factors such as contaminant release rates are fairly constant or predictable.

4.0 Maximum Use Concentration (MUC)

Site conditions and exposure levels can vary from day to day. The RHSM shall take a conservative approach when estimating exposure levels by calculating the MUC for the respirator worn by the employee for each substance. The respirator worn by the employee shall limit his or her exposure to the hazardous substance, when measured outside the respirator, at or below the MUC.

The MUC is determined by the respirator assigned protection factor (APF) or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined mathematically by multiplying the specified APF for a respirator by the required Occupational Safety and Health Administration (OSHA)-permissible exposure limit (PEL), short-term exposure limit (STEL), or ceiling limit (CL). For hazardous substances that do not have an OSHA exposure limit, other airborne exposure guidelines, such as the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs), can be used.

The MUC cannot be used for work conditions immediately dangerous to life or health (IDLH) and respirators listed for IDLH must be used. When the calculated MUC exceeds the IDLH level for a hazardous substance, or the performance limits of the cartridge or canister, then employers must set the maximum MUC at that lower limit.

5.0 Workplace and User Factors

The RHSM shall consider the following workplace and user factors when determining specific respiratory protection effectiveness:

- Based on the size and configuration of the workplace, determine if employees wearing the required respiratory protection are able to work in tight or enclosed areas.
- Determine whether the respiratory protection will limit the ability of users to communicate with one another, as necessary.
- Determine the work load and whether a heavy work rate depletes air supply quickly, or will a combination of respiratory protection and work rate cause stressful conditions; or are more comfortable respirators appropriate for long duration use?
- Consider whether environmental conditions such as temperature and humidity will affect filter elements or cause stressful conditions for users of certain respiratory protection.
- Determine whether workplace conditions and location will limit mobility and whether moving machinery will cause entanglement hazards to breathing air supply lines.

- Determine whether the employee will need to wear corrective glasses with the respirator. Provide spectacle kits for fullface respirators when needed by employees.

The SSC is responsible for routinely evaluating respirator use and notifying the RHSM of any change from the expected site conditions that may alter the effectiveness (i.e., performance and reliability) of the selected respiratory protection. The RHSM shall make necessary corrections to the selection based on this information.

6.0 Select Appropriate Respiratory Protection

Only NIOSH-certified respiratory protection shall be selected and such protection shall be used within the limitations of the certification.

OSHA substance-specific standards have specific requirements for using respiratory protection. Refer to those OSHA substance-specific standards for these requirements. The substance-specific requirements supersede the general requirements of this SOP. For example, only atmospheric-supplied respirators are permitted for protection against methylene chloride.

Atmospheres that are not or cannot be reasonably estimated must be treated as IDLH environments.

6.1 Assigned Protection Factors (APFs)

OSHA provides APFs in the revised respiratory protection standard (effective November 22 2006). Listed in Table 1, below, is the APF to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

Table 1. Assigned Protection Factors⁵

Type of respirator ^{1, 2}	Quarter mask	Half mask	Full Facepiece	Helmet/ hood	Loose-fitting Facepiece
1. Air-Purifying Respirator	5	10 ³	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	.....	50	1,000	25/1,000 ⁴	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	.....	10	50	.....	.....
• Continuous flow mode	.....	50	1,000	25/1,000 ⁴	25
• Pressure-demand or other positive-pressure mode	.....	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	.....	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	.....	10,000	10,000	.....

Notes:

¹ Respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance or when required respirator use is independent of concentration.

² The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program, including training, fit testing, maintenance, and use requirements.

³ This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

⁴ Evidence must be provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other powered air-purifying respirators (PAPRs) and supplied-air respirators (SARs) with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

⁵ These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, the appropriate substance-specific standards apply. Escape respirators for other IDLH atmospheres are specified in Section 6.4 of this document.

6.2 Respiratory Protection for Gas and Vapor Atmospheres

The following respirators shall be used for protection against gases and vapors:

- Atmosphere-supplying respirator
- An APR with one of the following:
 - A cartridge and canister end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant
 - A schedule for cartridge and canister change-out

If an APR without an ESLI will be used, the RHSM shall develop a cartridge and canister change-out schedule using the guidelines provided in Attachment 5 of this SOP.

6.3 Respiratory Protection for Particulate Atmospheres

One of the following respirators shall be used for protection against particulates:

- An atmosphere-supplying respirator
- An APR equipped with one of the following:
 - A NIOSH-certified high efficiency particulate air (HEPA) filter or NIOSH-certified particulate filter (i.e., filter series N, R, and P)
 - Any NIOSH-certified particulate filter if the particles have mass median aerodynamic diameters (MMAD) of at least 2 micrometers (i.e., filter series DM and DFM)

If an OSHA substance-specific standard specifically requires a HEPA filter, the only allowable filters are NIOSH-certified HEPA filters or filter series N100, R100, and P100.

When oil aerosols are present in the atmosphere, the preferred filter is a filter series “P” (i.e., oil proof), which may be used for more than one work shift. Filter series “R” (i.e., oil resistant) may be used for only one work shift. Filter series “N” (i.e., non-oil resistant) shall not to be used in atmospheres containing oil aerosols.

6.4 Respiratory Protection for IDLH atmospheres

One of the following respirators shall be used for protection in IDLH atmospheres:

- Combination full facepiece pressure-demand SAR with auxiliary self-contained air supply
- Full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of 30 minutes

Respirators provided for escape from IDLH atmospheres only shall be NIOSH-certified for escape from the atmosphere in which they will be used.

6.5 Other Considerations

Eye and face irritants. Some contaminants may irritate the eyes and face or have an exposure pathway through the eyes. For these contaminants only full-face respiratory protection shall be used.

PAPR requirement. Some substance-specific standards, such as asbestos, arsenic, benzene, cadmium, and lead allow employees to choose a PAPR over an APR when a PAPR offers adequate protection.

Medical evaluation limitations. The Corporate Consulting Occupational Physician's written recommendation may limit the type of respiratory protection an employee can use.

Attachment 5: Cartridge or Canister Change-Out Schedules

1.0 General

The Occupational Health and Safety Administration (OSHA) Respiratory Protection standard requires that a cartridge or canister change-out schedule is established and implemented when air-purifying respirators (APR) without cartridge or canister end-of-service-life indicators (ESLI) appropriate for the workplace conditions are used for protection against gases and vapors. The National Institute for Occupational Safety and Health (NIOSH) currently has approved ESLI for four cartridges or canisters: mercury vapor, carbon monoxide, ethylene oxide, and hydrogen sulfide. A change-out schedule is required for air-purifying respirator (APR) use for protection from gases and vapors. The following guidelines are provided to assist the Responsible Health Safety Manager (RHSM) in developing change-out schedules.

2.0 Objective

The change-out schedule is to ensure that APRs are not used in situations where a chemical cartridge or canister becomes saturated such that the gas or vapor contaminant can “break through” the filter’s sorbent element and enter the respirator.

3.0 Warning Properties

The use of warning properties as the sole basis for determining change-out schedules is prohibited. Respirator users, however, have been trained to understand that abnormal odor or irritation is evidence that respirator cartridges and canisters need to be replaced and to inform the Site Safety Coordinator (SSC) when this occurs. The SSC is required to contact the Responsible Health and Safety Manager (RHSM) to determine whether revision to the cartridge change-out schedule is needed. Where an effective change-out schedule is implemented, APR respirators may be used for gases and vapors having few or no warning properties.

4.0 Factors Influencing Cartridge or Canister Service Life

The following is a partial list of the factors that can influence the service life of a cartridge or canister, followed by established “rules of thumb”:

- Contaminant's chemical properties: For chemicals with boiling points greater than 70° C and a concentration less than 200 parts per million (ppm), a service life of 8 hours at normal work rate can be expected (OSHA has not approved this rule and it therefore should not be used as the primary determining factor).
- Contaminants concentration: Reducing the concentration by a factor of 10 increases service life by factor of 5.
- Temperature: High temperatures can directly affect the performance of the activated carbon filters.

- Humidity: Humidity greater than 85 percent reduces service life by 50 percent.
- Work rate (breathing rate) of the respirator user: Service life is inversely proportional to work rate.
- Variability of respirator cartridges between manufacturers
- Presence of multiple contaminants: See change-out schedule for mixtures in Section 7.2

5.0 OSHA Substance-Specific Change-Out Schedules

OSHA has developed change-out schedules in the following substance-specific standards:

OSHA Change-Out Schedules

Contaminant	Standard Reference	Change-Out Schedule
Acrylonitrile	1910.1045(h)(2)(ii)	End-of-service life or end of shift (whichever occurs first)
Benzene	1910.1028(g)(2)(ii)	End-of-service life or end of shift (whichever occurs first)
Butadiene	1910.1051(h)(2)(ii)	After 4 hours for concentrations up to 5 ppm After 3 hours for concentrations between 5 and 10 ppm After 2 hours for concentrations between 10 and 25 ppm After 1 hour for concentrations up to 50 ppm
Formaldehyde	1910.1048(g)(2)(ii)	Cartridges: end-of-service life or after 3 hours (whichever occurs first) Canisters: end-of-service life or after 4 hours for concentrations up to 7.5 ppm (whichever occurs first) Industrial Canisters: end-of-service life or after 2 hours for concentrations up to 75 ppm (whichever occurs first)
Vinyl Chloride	1910.1017(g)(3)(ii)	End-of-service life or end of shift (whichever occurs first)
Methylene Chloride	1910.1052(g)(2)(ii)	Canisters may only be used for emergency escape and must be replaced after use

6.0 Developing Change-Out Schedules

Development of the change-out schedule must be based on reliable information on the service life of the cartridge or canister. Such information may include breakthrough test data or use recommendations from respirator manufacturers or chemical suppliers.

6.1 Breakthrough Test Data

The RHSM shall determine if there is objective breakthrough test data available for the make and model of respirator cartridge or canister to be used and whether the test data is sufficient to develop the change-out schedule. Sources of breakthrough test data include:

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- Respiratory manufacturers objective data: see MSA web site (<http://www.msanet.com/safetyproducts/resptest/index.html>).
 - Experimental breakthrough-time data from industry organizations, trade associations, professional societies, academic institutes, and laboratory tests.
 - Review the Gerry O. Wood Math Model Table on the OSHA web site that lists breakthrough times for 120 chemicals at various concentrations. The breakthrough times were derived using two activated charcoal cartridges at 26 grams each, at a flow rate of 53.3 liters per minute (lpm), at 72° F, and 50 percent humidity. The table is located at http://www.osha.gov/SLTC/etools/respiratory/wood_table/wood_table.html.
 - Download from the OSHA web site “The Advisor Genius: Calculating the Wood Equation” Microsoft Windows Program, which calculates a standard list of 120 chemicals or additional chemicals based on providing the substance’s properties. The program is located at http://www.osha.gov/SLTC/etools/respiratory/advisor_genius_wood/advisor_genius.html.

There are numerous factors (see Section 4.0 of this attachment) that influence cartridge breakthrough time that must be considered. The RHSM shall take a conservative approach, basing the schedule on worst-case conditions found in the workplace, and providing an additional margin of safety to ensure that breakthrough is not likely to occur during respirator use.

6.2 Recommendations from Respiratory Manufacturers

When breakthrough data are not available, the RHSM shall seek other information on which to base a reliable cartridge or canister change-out schedule. The most readily available alternative is to rely on recommendations of the respirator manufacturer. To be reliable, such recommendations shall consider workplace-specific influencing factors (see Section 4.0 of this attachment) that are likely to affect cartridge or canister service life.

7.0 Other Considerations

7.1 Analogous Chemical Structures

When breakthrough test data or other information is not available for the contaminant under evaluation, the RHSM may rely on service life values from other chemicals having analogous chemical structures. In some cases a chemical with known migration may reasonably be anticipated to act as a surrogate for a similar chemical that would have less rapid migration. The RHSM could assume that a heavier, less volatile compound than another in the same chemical series that had been tested for breakthrough would breakthrough no faster than the latter compound, such as benzene versus toluene. This method may be used as long as objective data or information for lower molecular weight compounds is used to predict the breakthrough times for higher molecular weight analogues containing only additional methyl or phenyl groups. Data from higher molecular weight groups should not be used to predict the behavior of analogous substances with lower molecular weight. This approach

relies heavily on experimental data and expert analysis. This method may be less accurate than others and should be used only when better information is not available.

7.2 Change-Out Schedules for Multiple Contaminants (Mixtures)

Establishing cartridge or canister service life for mixtures of contaminants is a complex task that requires considerable professional judgment to create a reasonable change-out schedule. The change-out schedule for a mixture should be based on reasonable assumptions that include a margin of safety. Where the individual compounds in the mixture have similar breakthrough times (within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component or compound with the shortest breakthrough time (sum up the concentration of the components). Where the individual compounds in the mixture vary by two orders of magnitude or more, the service life may be based on the contaminant with the shortest breakthrough time.

7.3 Chemical Contaminant Migration

Some contaminants have a tendency to migrate through cartridge or canister sorbent material during periods of storage or non-use. This is characteristic of the contaminant-carbon bed interaction for organic chemicals with boiling points below 65° C and would predictably shorten breakthrough times. In cases where respirators are used for multiple days, this could present an additional exposure to the respirator user. Where contaminant migration is possible, respirator cartridges or canisters should be changed after every workshift where exposure occurs unless specific objective data to the contrary (e.g., desorption studies) shows the performance of the cartridge in the conditions and schedule of use and non-use found in the workplace.

8.0 Implementing the Change-Out Schedule

The RHSM shall provide the change-out schedule and document the information relied upon (i.e., summary of objective data or recommendations) for establishing the schedule in the personal protective equipment section of the site-specific written plan (i.e., Health, Safety, and Environmental Protection Plan or Field Safety Instructions).

Since actual site conditions may differ or change from the criteria used to develop the schedule, the RHSM shall also include the assumptions made regarding the influencing factors (see Section 4.0 of this attachment). This will allow the SSC to determine when the schedule may need to be revised. The RHSM may choose to include alternatives to the schedule based on changing conditions (that is, change-out every 4 hours for concentrations up to 100 ppm, 2 hours for 200 ppm).

Respirator users shall be instructed to strictly follow the requirements of the change-out schedule and to report any gas or vapor breakthrough.

Attachment 6: Respirator User Seal Check Procedure

Individuals who use tight-fitting respirator facepieces are required to perform a user seal check each time the respirator facepiece is put on to ensure that an adequate seal is achieved. Either the positive or negative pressure checks listed below may be used.

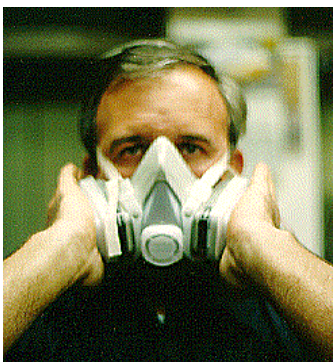
1.0 Positive Pressure Check

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if you can build up a slight positive pressure inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires you to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.



2.0 Negative Pressure Check

Close off the inlet opening of the canister or cartridge(s) by covering it (them) with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold your breath for 10 seconds. If the design of the inlet opening of some cartridges cannot be effectively covered with the palm of your hand, the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and you detect no inward leakage of air, the tightness of the respirator is satisfactory.



Attachment 7: Respirator Inspection Procedures

Respirators in regular use shall be inspected by the wearer before each use and during respirator cleaning. The inspection shall include an examination of all respirator components for obvious damage or defects and a check of all rubber components for pliability and signs of deterioration.

Respirators found to be damaged or defective during the inspection shall be taken out of service or repaired, as outlined in Section 5.9 of the CH2M HILL Respiratory Protection Program (HSE-121).

The following instructions are provided as minimum inspection criteria. Respirator manufacturer's guidelines shall be followed when they provide more specific inspection criteria.

1.0 Tight-Fitting Respirator Facepiece

Facepiece, inspect for the following:

- Excessive dirt, paint, grime or other material that would interfere with face seal or respirator operation
- Cracks, tears, holes, rough edges, excessive wear, or physical deformity
- Inflexibility of rubber components and signs of deterioration

Head straps or head harness, inspect for the following:

- Cuts, warping, or other damage
- Loss of elasticity or excessive wear
- Broken or malfunctioning buckles and attachments

Lens (full-facepiece), inspect for the following:

- Cracked, warped, or badly scratched lenses
- Incorrect mounting, broken or missing retaining clips or clamps

Inhalation and exhalation valves, inspect for the following:

- Foreign material such as detergent residue, dirt, or hair under the valve seat
- Cracks, tears, or distortion in the valve material
- Cracks, breaks, or chips in the facepiece valve body
- Improper seating of the valve to the valve sealing surface
- Improper installation of the valve
- Missing or defective valve cover

Speaking diaphragm

- Verify that the speaking diaphragm retainer ring is hand tight

2.0 Loose-Fitting Respirators

Hoods, helmet, blouse, or full suit respirators shall be inspected for the following:

- Tears, holes, and seam integrity
- Cracks, breaks, or impaired vision to faceshield

3.0 Air-Purifying Respirators (APR)

Air-purifying elements and connections, inspect for the following:

- Cracked or broken air-purifying element holder(s), or badly worn threads
- Missing or damaged gasket(s)
- Loose connections or cross threading
- Incorrect cartridge or canister for the hazard (this information is provided in the Health and Safety Plan [HSP], or Field Safety Instruction [FSI])
- Expired shelf life of cartridge or canister
- Cracks or dents to cartridge or canister

4.0 Powered Air-Purifying Respirators (PAPR)

Air-purifying elements and connections

- Follow inspection criteria covered in APR above

Breathing tube and connections, inspect for the following:

- Missing or deteriorated gaskets and O-rings
- Missing or loose hose clamps
- Loose connections or worn threads
- Cracks, holes, or deterioration of breathing tube (stretch out while inspecting)

Battery check

- Connect the PAPR battery to the charger to check that the battery is fully charged. If not fully charged, recharge the battery in a non-explosive atmosphere.

Flow check

- With a cartridge installed in the filter assembly, turn the respirator on and check for operation. Place the facepiece into contact with your chin. A steady flow of air should fill the facepiece, creating a slight positive pressure.

5.0 Supplied-Air Respirator (SAR)

Air supply lines, inspect for the following:

- Missing or deteriorated gaskets and O-rings
- Missing or loose hose clamps
- Loose connections or worn threads

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- Cracks, holes, or deterioration of hoses
 - Correct operation and condition of regulators, valves and other air-flow regulators

6.0 Self-Contained Breathing Apparatus (SCBA)

SCBAs for emergency use only shall be inspected monthly. Documentation of the monthly inspection shall be kept with the SCBA.

Straps and Buckles

- Visually inspect for complete set of straps and for frayed or damaged straps that may break during use. Be sure that the screws holding straps together are present.
- Visually inspect mating ends of buckle and check locking function.

Cylinder and Backplate

- Remove the cylinder and visually inspect the backplate for cracks and missing rivets or screws.
- Verify that the cylinder is charged to at least 90 percent of full pressure. If below 90 percent, have the cylinder recharged.
- Visually determine that the cylinder valve lock is present and inspect the cylinder gauge for condition of its face, needle, and lens.
- Verify that the hydrostatic test date is current and inspect the cylinder for large dents or gouges in metal.
- Engage the cylinder lock and check that the cylinder is tightly fastened to the backplate.
- Check that the high-pressure hose connector is tightly secured on the cylinder fitting.

Cylinder Head and Valve Assembly

- Check that the high-pressure hose connector is tightly secured on the cylinder fitting.
- Check that the mainline and bypass valves close properly. Close the valves.
- Make sure the regulator outlet is not covered or obstructed.
- Open the cylinder valve and listen or feel for leakage around the packing. (If leakage is noted, do not use the SCBA until it is repaired.) Check for proper functioning of the valve lock.

High-Pressure Hose and Connector

- Listen or feel for leakage in the hose (air line) or at hose-to-cylinder connector. (A bubble in the outer hose covering may be caused by seepage of air through the hose when stored under pressure. This does not necessarily indicate a faulty hose.)

Regulator and Low-Pressure Alarm

- Cover the outlet of the regulator with the palm of your hand. Open the main line valve and read the regulator gauge; it should agree with the cylinder gauge.

-
- Close the cylinder valve and slowly move your hand from the regulator outlet to allow a slow flow of air. A low-pressure alarm should sound when the pressure falls to about 550 psi.
 - Place your mouth on or over regulator outlet and blow lightly. A positive pressure should be created and maintained for 5 to 10 seconds without any loss of air. Next suck the regulator to create a slightly negative pressure and hold it for 5 to 10 seconds. Vacuum should remain constant. This tests the integrity of the diaphragm. Any loss of pressure or vacuum during this test indicates a leak that must be repaired.
 - Open the cylinder valve.
 - Place your hand over the regulator outlet and open the mainline valve. Remove your hand from the outlet and rapidly replace it again. Repeat this twice. Air should escape when your hand is removed each time, indicating a positive pressure in the chamber. Close the mainline valve and remove your hand from the outlet.
 - Verify that no obstruction is in or over the regulator outlet. Open and close the bypass valve momentarily to ensure that there is a flow of air through the bypass system.

Breathing Tube and Connections

- Stretch the breathing tube and inspect for cracks, holes, or deterioration.
- Inspect the connector to determine the condition of its threads and for presence and proper condition of the O-ring or rubber gasket.

Attachment 8: Respirator Cleaning and Disinfecting Procedures

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
2. Wash components in warm (110° F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
3. Rinse components thoroughly in clean, warm (110° F maximum), preferably running water. Drain.
4. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
 - Hypochlorite solution (50 parts per million [ppm] of chlorine) made by adding approximately 1 milliliter of laundry bleach to one liter of water at 110° F
 - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6 to 8 grams ammonium or potassium iodide per 100 cubic centimeters [cc] of 45 percent alcohol) to one liter of water at 110° F
 - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer
5. Rinse components thoroughly in clean, warm (110° F maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Components should be hand-dried with a clean, lint-free cloth or air-dried.
7. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
8. Test the respirator to ensure that all components work properly.



Attachment 9: Subcontractor Safety Procedure Criteria— Respiratory Protection

The following criteria are not intended to be all inclusive but are provided as a tool to facilitate development and review of subcontractor safety procedures. Subcontractors are expected to address the following items in their safety procedures.

1.0 Minimum Acceptable Criteria for Subcontractor Respiratory Protection Safety Procedures:

1. Provide name and qualifications of the “program administrator” responsible for overseeing your respiratory protection program (years and type of experience, training background, etc.).
2. Describe training requirements for respirator users.
3. Describe medical evaluation requirements for respirator users.
4. Describe fit testing requirements for respirator users.
5. Describe methods used in the respirator selection process, such as estimating exposure level. Provide types of respiratory protection to be used, in known.
6. If air-purifying respirators will be used for protection against gases, or vapors, or both, describe methods used to determine cartridge or canister change-out schedules.
7. Describe respirator procedures to include respirator use, inspection, cleaning and disinfecting, storage, and repair.
8. If atmosphere-supplying respirators will be used, describe methods used in providing and maintaining Grade D breathing air.
9. Describe methods to be used to evaluate the effectiveness of your respiratory protection program on this project.



Agency Inspections and Enforcement

Enterprise Standard Operating Procedure HSE-201

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the procedures associated with project and office inspections conducted by external regulatory agencies, the communications for informing key individuals, and the process for tracking and resolving enforcement actions.

2.0 Scope and Application

2.1 Scope

This SOP provides the requirements for CH2M HILL staff when an external regulatory agency inspects a CH2M HILL office, Business Group (BG) project or facility, the associated notifications within the company, and the process for resolving enforcement actions. External regulatory agency inspections that may occur at CH2M HILL projects or facilities include those conducted by: federal and state OSHA; federal Mine Safety and Health Administration (MSHA); federal and state Environmental Protection Agencies (EPA). External regulatory agency inspections that may occur at CH2M HILL offices include: those conducted by state OSHA, Federal Aviation Administration (FAA) and municipalities (eg. fire departments).

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL Legal Entities, project field sites, offices, and client facilities that operate in the United States (U.S.).

Where state Occupational Safety and Health Administration (OSHA) agencies may have more stringent requirements, contact the appropriate Responsible Business Group (BG) HSE Manager to address these specific requirements.

For international operations, this SOP should be followed as a minimum requirement. Country-specific HSE regulations (i.e., Canada, Australia, or European Union countries) have varying and specific requirements for regulatory agency inspections and those regulations are to be followed.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standards of Practice and Standard Operating Procedures that are applicable to this Arsenic SOP are as follows:

- **HSE-106, Emergency Planning**
- **HSE-111, Incident Notification, Reporting, and Investigation**
- **HSE-109, HSE Audits**

3.0 Definitions

None

4.0 Roles and Responsibilities

The roles and responsibilities provided in the HSE Responsibilities Core Standard apply to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Office and Field Staff

- Office staff (receptionist in most cases) notifies the Office Safety Coordinator (OSC) of any external regulatory agency inspections in CH2M HILL offices. If the OSC is not immediately available the Area Manager is to be notified.
- Field (project) staff report contact with an external regulatory agency inspector to the Site Safety Coordinator. If the Site Safety Coordinator is not immediately available, the Project Manager is to be contacted.
- Office and field staff shall cooperate with agency inspectors, provide accurate and truthful information, in accordance with this SOP.

4.2 Office and Site Safety Coordinator

- The Office Safety Coordinator (OSC) implements the Office Safety Program in CH2M HILL offices and the Site Safety Coordinator (SSC) implements the project-specific Field Safety Instruction or Health and Safety Plan on CH2M HILL projects.
- The OSC and SSC serve as the primary point of contact for agency inspections.
- The OSC notifies the Area Manager (AM) on the arrival of an agency inspection.
- The SSC notifies the Project Manager on the arrival of an agency inspection.
- The OSC notifies the Enterprise Office Safety Program Manager for H&S agency inspections and CH2M HILL's Dangerous Goods Shipping Coordinator on the arrival of a FAA inspection.
- If the PM or AM cannot be immediately contacted, the OSC and SSC notifies the Responsible Health and Safety Manager (RHSM) directly of agency inspections.
- Referring agency inspections conducted pursuant to a warrant to the RHSM ..
- Verifying the credentials of the inspector prior to allowing an inspection of the workplace. Inspectors include OSHA Compliance Safety and Health Officer(s) (CSHO), EPA agents or authorized state inspector.
- Notifying the RHSM or REM of the opening and closing conference location(s) and time(s).
- Accompanying the agency inspector on walk-around inspections.
- Gathering information during compliance inspections, as outlined in this SOP.
- Coordinating abatement requirements and activities with RHSM or REM.

- Tracking and verifying completion of citation abatement activities.
- Posting copies of citations for employee review.

4.3 Project Manager or Area Manager

- Notifying the RHSM of agency inspections.
- Attending opening and closing conferences.
- Verifying that hazards identified during walk-around inspections are immediately corrected.
- Providing resources for the abatement of citation items.
- Implementing timely abatement of citation items.

4.4 Responsible Health and Safety Manager

- The Responsible Health and Safety Manager (RHSM) is either the Responsible BG HSM for BG projects or facilities or the Enterprise Office Safety Program Manager for CH2M HILL offices.
- The Responsible BG HSM notifies BG HSE Lead of the BG project or facility for Health and Safety (H&S) agency inspections and the Responsible Environmental Manager (REM) for environmental agency inspections.
- The Enterprise Office Safety Program Manager notifies the HSE Operations Director of office H&S agency inspections and the Environmental Director for FAA and Environmental agency inspections.
- Coordinates (H&S) agency inspections with the OSC, SSC, Project Manager and/or Area Manager.
- Immediately referring agency inspections conducted pursuant to a warrant to Legal and Insurance Department (LID).
- Immediately refers agency enforcement actions (OSHA/MSHA citations) to the BG HSE Lead.

4.5 Responsible Environmental Manager

- Notifying the BG HSE Lead of BG project or facility environmental agency inspections.
- Notifying the Environmental Director of environmental agency office inspections.
- Coordinating environmental agency inspections with the appropriate BG or facilities services staff.
- Immediately referring environmental agency inspections conducted pursuant to a warrant to LID.

4.6 Business Group HSE Lead

- Notifying HSE Operations Director and Environmental Director of BG project or facility HSE agency inspections.

- Coordinating site response to BG project or facility HSE agency inspections with RHSM or REM and PM.
- Notifying BG President, BG Legal Counsel, HSE Operations Director and Environmental Director of pending agency enforcement actions (citations/NOVs).
- Arranging for an “informal conference” with local OSHA area office within 15 working days of issued OSHA citations.
- Notifying HSE Operations Director and Environmental Director of BG project and facility agency inspections and final disposition of citations/NOVs for tracking purposes.
- Conducting HSE Audits on BG projects and facilities, most at risk from regulatory agency enforcement actions, as part of the BG’s HSE auditing process.
- Incorporating agency inspection procedure training into BGs HSE training program for site managers and supervisors.
- Developing and implementing HSE compliance improvement plans when BG experiences higher enforcement rates.

4.7 HSE Operations Director

- Coordinating response to H&S regulatory agency (OSHA/MSHA) enforcement actions with BG HSE Lead, BG Legal representative and corporate counsel for OSHA/MSHA citations.
- Determining strategy with BG HSE Lead and Legal for defense of OSHA citations during informal conference at the local OSHA area office.
- Recommending an enforcement action response, in conjunction with the BG HSE Lead and Legal, to the Senior VP HSE and the BG President, as a result of the informal conference for OSHA/MSHA citations. Recommended responses range from accepting a negotiated settlement at the informal conference or contesting citations during future legal proceedings with OSHA/MSHA.
- Track and trend enterprise H&S regulatory agency (OSHA/MSHA) inspections and citations issued and final disposition by BG and legal entity cited.
- Periodically communicate BG enforcement rates to the BG HSE Lead and require BG HSE Program Improvement Plans to be implemented when BG experiences higher enforcement rates.
- Developing agency inspection procedures training for the BG HSE’s use in training BG site managers and site supervisors.

4.8 Environmental Director

- Coordinating response to environmental regulatory agency enforcement actions with the BG HSE Lead, BG Legal Counsel for federal or state environmental violations or NOVs.
- Recommending enforcement action response, in conjunction with the BG HSE Lead and BG Legal Counsel, to the HSE Operations Director.

- Tracking and trending enterprise environmental inspections and NOV's issued and final disposition by BG and legal entity cited.

4.9 Legal Department

- Participating in agency inspections conducted pursuant to a warrant.
- Participating in regulatory agency enforcement action response for issued citation and NOV's.

5.0 Inspections

It is CH2M HILL policy to cooperate with regulatory agency inspectors, immediately correct deficiencies identified during compliance inspections and provide for timely resolution of citations. CH2M HILL employees who wish to, or are requested to, speak to compliance personnel shall not be discriminated against, intimidated or otherwise mistreated for exercising their rights during compliance inspections. Regulatory agency inspectors will be given access to the site after the opening conference and will be accompanied during the inspection.

5.1 Types of Inspections

OSHA, MSHA, EPA, FAA and authorized state or local agencies have authority to inspect any facility that is subject to health, safety and environmental legislation. Inspections may be announced or unannounced. The following describes the types of agency inspections.

5.1.1 OSHA Unprogrammed Inspections

- ***Imminent danger inspections*** can be conducted for any condition where there is reasonable certainty that danger exists which can be expected to cause death or serious physical harm immediately or before the danger can be eliminated through normal procedures.
- ***Fatalities and catastrophe investigations.*** CH2M HILL is required to give notification within 8 hours after the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of a work-related incident. This notification must be by telephone or in person to the OSHA Area Office that is nearest to the site of the incident.
- ***Formal complaint inspections*** can result when written complaints are brought to OSHA by past or present employees, a representative of an employee, a concerned citizen, or referrals (any other source, including media reports).

5.1.2 OSHA Programmed Inspections

- Inspections of worksites that have been scheduled based upon objective or neutral selection criteria are defined as programmed inspections. The worksites are selected according to national or regional scheduling plans for safety and health or special emphasis programs.

5.1.3 OSHA Follow-up and Monitoring Inspections

- A follow-up inspection is used to determine if the previously cited violations have been corrected.
- Monitoring inspections are conducted to ensure that hazards are being corrected and employees are being protected, whenever a long period of time is needed for an

establishment to come into compliance, or to verify compliance with the terms of granted variances.

- Issuance of citations for willful, repeated, and high gravity serious violations; failure to abate notifications; and citations related to imminent danger situations are examples of prime candidates for follow-up or monitoring inspections.
- Follow-up or monitoring inspections are not usually conducted when evidence of abatement is provided by the employer or employee representatives. Normally, no additional inspection activity will occur unless, in the judgment of the CSHO, significant changes in the workplace occur which warrant further inspection activity.

6.1.4 Scope of OSHA Inspections

OSHA inspections, either programmed or unprogrammed, fall into one of two categories, depending on the scope of the inspection:

- A *comprehensive inspection* is a substantially complete inspection of the potentially high-hazard areas of the establishment. An inspection may be deemed comprehensive even though, as a result of the exercise of professional judgment, not all potentially hazardous conditions, operations and practices within those areas are inspected. Comprehensive inspections may be programmed or unprogrammed.
- A *partial inspection* is an inspection whose focus is limited to certain potentially hazardous areas, operations, conditions or practices at the establishment. A partial inspection may be expanded based on information gathered by the CSHO during the inspection process. Consistent with the provisions of Section 8(f)(2) of the OSHA Act, and Area Office priorities, the compliance officer shall use professional judgment to determine the necessity for expanding the inspection scope, based on information gathered during records or program review and walk-around inspection.

5.1.5 MSHA Inspections

MSHA conducts mandatory scheduled inspections of all mine sites. Surface mines (sand and gravel) are inspected biannually and underground mines are inspected quarterly. Additional inspections will be performed for accidents, complaints (discrimination and hazardous conditions), and for willful violations of safety standards.

5.1.6 Environmental Agency Inspections

EPA and authorized state and local agencies have broad authority to inspect any facility or location where environmental laws and regulations apply. Environmental agencies have very broad authority to enter and inspect projects.

The schedule that inspections may be performed is left to the agency's reasonable discretion. For example, CERCLA authorizes EPA to enter facilities "at reasonable times" and RCRA provides for mandatory biennial inspection of all permitted facilities and authorizes permissive administrative inspections "at all reasonable times." Further, administrative inspections of permitted facilities, an agency may obtain a warrant to conduct an inspection where there is probable cause of an environmental violation, such as a citizen complaint or pursuant to a "neutral enforcement scheme." This means that probable cause may be established if the agency demonstrates that the premises are being inspected pursuant to a regularly imposed schedule.

5.2 Inspection Procedures

The following procedures apply to external agency inspections, such as OSHA, MSHA or EPA.

5.2.1 Preventive Actions

The BG HSE Director must periodically identify projects, offices or facilities that are likely to be subject to agency inspections and conduct periodic internal HSE audits as part of the BG's HSE auditing program.

5.2.2 Notification

- Office and field personnel must immediately notify the OSC or SSC of any agency inspections.
- The OSC or SSC must immediately notify the Area Manager (AM) or Project Manager (PM) of any agency inspections.
- The Project Manager or Area Manager must notify the RHSM immediately of any regulatory agency inspections.
- The RHSM must immediately notify BG HSE Lead of H&S agency inspections and must immediately notify the REM of inspections by environmental agencies.
- The RHSM must immediately notify the Legal Department of agency inspections conducted pursuant to a warrant.
- The OSC or SCC, with assistance from the RHSM and REM, must coordinate and implement the inspection procedures in this SOP.
- The RHSM and/or REM must notify the BG HSE Lead of all agency inspections, who notifies the HSE Operations Director and Environmental Director..

5.2.3 Inspector Credential Verification

The verification process shall be conducted as follows:

- Upon arrival, the OSC or SSC must request the inspector to provide official credentials.
- Verification of credentials shall be made by visual examination and contacting the inspectors Area Office that is nearest to the site. The Area Director shall verify the name of the inspector and purpose of inspection. This information shall be immediately communicated to the project manager.
- The inspector shall sign the visitors log and be given a health, safety, and environmental protection briefing.
- Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector is required to meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify the same.
- The verification process shall not exceed one hour.

- The verification process shall be conducted in the presence of site security personnel, where available.

5.2.4 Opening Conference

The opening conference shall be conducted as follows:

- The CH2M HILL Project Manager, OSC or SSC, RHSM or REM, and the inspector shall determine attendees for the opening conference. The RHSM (for OSHA inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint if applicable.
- The inspector shall outline the scope of the inspection, including private employee interviews, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).
- During the opening conference, the inspector may determine whether the employees of any other employers are working at the establishment. If these employers may be affected by the inspection, the scope may be expanded to include others, or a referral made at the discretion of the inspector. At multi-employer sites, copies of complaint(s), if applicable, shall be provided to CH2M HILL if CH2M HILL is affected by the alleged hazard(s).

5.2.5 Request for Records

An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. This log shall be presented to the OSHA inspector for review.

Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.

Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based

Office logs and some project logs are maintained electronically and may be obtained by the following process:

Security rights are required to use the OSHA Log Generator function in the Hours and Incident Tracking System (HITS). Contact your Business Group HSE Lead to obtain access.

1. From the HSE web page, select "Hours and Incident Tracking System (HITS)" under the "Tools" menu.
2. From the HITS Home page, click **Reports** on the top menu.
3. Select **OSHA 300/300A Logs** from the Report Type pick list.
4. Select whether you want employee names to appear on the OSHA 300 log by selecting Yes or No from the Include Employees Names pick list.
5. Select the year of the OSHA logs. For OSHA logs prior to 2007, contact your Business Group HSE Lead.
6. Select the CH2M HILL Company of the OSHA logs.

Select the location of the OSHA log:

- To run an OSHA log for the entire company, select All Locations.
 - To run an OSHA log for a specific office within the company, select Specific Office. Then select the office from the office pick list.
 - To run an OSHA log for a specific project within the company, select Specific Project. Then select the project from the project pick list.
7. Click **Submit**. A confirmation page appears stating that the OSHA log will be sent to you as an email attachment.
 8. From the confirmation page, select “close this window.”

For additional assistance with this process, contact your BG HSE Lead.

5.2.6 Inspection

After the opening conference, the inspector will inspect work areas for health, safety and environmental issues.

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. However, the inspector may consider expanding the scope of the inspection based on the information and observations made available during the inspection process.
- The OSC or SSC or other(s) designated by the RHSM or REM must accompany the inspector during the inspection. Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The OSC or SSC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector if they can wait until one is available.
- The inspector shall observe safety, health and environmental conditions and practices and document the inspection process. Additionally, the inspector may take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL shall gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector (such as, similar camera angles, environmental conditions, instrument positioning). If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, the OSC or SSC shall request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be consulted during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.

- Copies of documents should not be provided to the inspector without the approval of the RHSM or REM or LID. DO NOT voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

5.2.7 Closing Conference

After the inspection, a closing conference shall be held as follows:

- The CH2M HILL PM, OSC or SSC, RHSM or REM shall be involved in the closing conference, as a minimum. A conference call may be utilized as a means for all to participate in the closing conference.
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions, and their context rights. Any unusual circumstances noted during the closing conference shall be documented by the OSC or SSC.
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended.
- The OSC or SSC shall request receipts for all samples and documents photocopied by the inspector, request a photocopy of the inspectors photograph log, and request a copy of the final inspection report.
- Any documentation from an agency inspection must be transmitted immediately to the RHSM or REM, and forwarded to the BG HSE Lead and/or Office Safety Program Manager.

6.0 Enforcement

An agency may exercise its enforcement authority if regulatory noncompliance is suspected or observed. An enforcement action may be brought against CH2M HILL, a client, or subcontractor at a project site, office or facility. The following procedures apply to all enforcement actions, including those issued to clients and our subcontractors.

6.1 Types of Enforcement

6.1.1 OSHA

Types of OSHA violations that may be cited and the penalties that may be proposed include the following:

- **Other than Serious Violations** are violations that have a direct relationship to job safety and health, but probably would not result in death or serious physical harm. A proposed penalty of up to \$7,000 for each violation is discretionary.
- **Serious Violations** are violations that entail a substantial probability that death or serious physical harm could result. A mandatory penalty of up to \$7,000 for each violation is proposed.
- **Willful Violations** are violations that the employer intentionally and knowingly commits. The employer is aware that a hazardous condition exists, knows that the condition violates a standard or other obligation of the Act, and makes no reasonable effort to eliminate it. Penalties of up to \$70,000 may be proposed for each willful violation. An employer who is convicted in a criminal proceeding of a willful violation of a standard that has resulted in the death of an employee may be fined up to \$250,000 (or \$500,000 if the employer is a corporation) or imprisoned up to 6 months, or both. A second conviction doubles the possible term of imprisonment.
- **Repeat Violations** are violations of any standard, regulation, rule or order where, upon reinspection, a substantially similar violation is found and the original citation has become a final order within the past 5 years. Repeated violations can bring a fine of up to \$70,000 for each such violation.
- **Failure to Correct Prior Violations.** Failure to correct a prior violation may bring a civil penalty of up to \$7,000 for each day the violation continues.

6.1.2 MSHA

MSHA citations can carry a fine from \$60 to \$60,000. If the violation is not Significant and Substantial (S&S), then it is eligible for the \$60 fine, other wise S&S violations will be \$72 to \$60,000. The fine depends on the size of the business, the history of operations, the degree of negligence, degree of gravity and demonstrated good faith. Unlike other agencies, MSHA can fine the employer and the employee.

6.1.3 Environmental

Types of environmental enforcement include the following:

- **Notice of Violation** is an administrative action that is advisory in nature. In these actions, the agency advises the manager of a facility as to what violation was found, what corrective action should be taken, and by what date. Informal responses carry no penalty or power to compel actions, but if they are ignored, they can lead to more severe actions.
- **Formal administrative responses** are legal orders that are independently enforceable, and which may require the recipient to take some corrective or remedial action within a specified period of time, to refrain from certain behavior or to require future compliance. If a person violates an order, the agency may go to court to force compliance. Administrative actions initiated by EPA are handled under EPA's internal administrative litigation system, which is comparable to any court system except that administrative law judges preside.
- **Civil judicial responses** are formal lawsuits brought in U.S. federal court by the Department of Justice at EPA's request. They are normally used against the more serious or recalcitrant violators of environmental laws or to seek prompt correction of imminent hazards. Civil

judicial cases generally result in penalties and court orders requiring correction of the violation and specific actions to prevent future violations.

- ***Criminal judicial responses*** are used when a person or company has knowingly and willfully violated the law. In a criminal case, the DOJ prosecutes an alleged violator in federal court, seeking criminal sanctions including fines and imprisonment. Criminal actions are often used to respond to flagrant, intentional disregard for environmental laws (such as "midnight dumping" of hazardous waste) and deliberate falsification of documents or records.

6.2 Preventive Action

The HSE Operations Director will track and trend H&S agency enforcement actions across the enterprise. The Environmental Director will track and trend environmental agency enforcement actions across the enterprise. Business Groups with increased HSE enforcement rates will implement a program improvement plan to address any program deficiencies that require corrective action. The plan must be submitted to the HSE Operations Director and/or Environmental Director for review and approval.

6.3 Notification of Enforcement Action

The following must be immediately notified of regulatory enforcement actions:

- The Project or Area Manager
- RHSM and/or REM (for environmental enforcement)
- BG HSE Director, who will notify the BG Environmental Manager (for environmental enforcement)
- BG Legal and Corporate Counsel designee for HSE agency enforcement actions
- BG President for significant HSE agency enforcement actions ,as determined by the Senior HSE VP
- HSE Operations Director and Environmental Director, who are responsible for tracking and trending HSE enforcement actions across the enterprise.

The BG Legal Counsel must be immediately notified of any criminal enforcement action, including but not limited to pursuant to a warrant, subpoena, interrogation or investigation.

6.4 Enforcement Response and Negotiation

The Senior HSE VP determines the management level that is responsible for resolving and negotiations HSE agency enforcement actions that may include the BG President for significant HSE agency enforcement actions at BG projects and facilities and the Corporate Affairs Executive for significant agency enforcement actions at CH2M HILL offices. On a case-by case basis, the Senior HSE VP will designate an enforcement action response and negotiating team, that may consist of the HSE Operations Director, Environmental Director, BG HSE Lead , BG Legal and Corporate Counsel designee, depending on the severity or significance of the HSE enforcement action.

6.4.1 OSHA Citations- Informal Conference

The employer may request an informal conference with the OSHA Area Office Director issuing the citations, **but must do so within the 15 workday contest period**. During the informal conference, the employer may present any evidence or views to support an adjustment to the citations and/or penalties. The informal conference must be scheduled early enough in advance to allow a sufficient period of time to contest the citations after participating in the informal conference.

In most all cases, CH2M HILL will request an informal conference with the OSHA Area office and the BG HSE Lead will schedule the informal conference with the OSHA area office. The BG HSE Lead and HSE Operations Director with Legal will determine the strategy for defense of any citations issued and who should be in attendance.

The purpose of the informal conference is to discuss the alleged violations, penalties and/or abatement period. The OSHA area director has the authority to enter into a settlement agreement that could revise the citation and/or penal. The informal conference is requested to dispute the alleged violation, proposed penalties, dispute the abatement period or simply to ask questions about the alleged violations and standards.

6.4.2 OSHA Citations-Notice of Contest

The employer has right to contest the citation and notification of penalty, all citation items or only individual items, the proposed penalty and/or the abatement date. The employer's intention to contest the citations and/or proposed penalties must be in writing and within 15 working days after receipt of the citations from OSHA by certified mail. Unless the citations are contested, the citations and proposed penalties become a final order of the Occupational Safety and Health Review Commission and may not be reviewed by any court or agency.

A copy of the the Notice of Contest must be posted on the jobsite along with the proposed citation for three working days. Upon receipt of the Notice of Contest, the file will be given to the OSHA Review Commission, which is an independent agency not associated with OSHA or the Department of Labor. The commission will assign the case to an administrative law judge (ALJ), who will schedule a hearing in a public place close to the workplace.

6.4.3 MSHA Citations

CH2M HILL may file in writing a Notice to Contest to the Federal Mine Safety and Review Commission (FMSHRC) within 30 days upon receipt of the issuance of the citation order. A civil penalty contest can be filed as well.

6.5 Enforcement Resolution

To ensure consistent resolutions and corrective actions across the enterprise, all settlement agreements or other proposed resolutions must be forwarded to the BG Legal and Corporate Counsel, the HSE and Environmental Director for approval. The HSE Operations Director and Environmental Director will track and record HSE agency enforcement actions to final resolution.

7.0 Training

Coordinating regulatory agency inspections will be presented to Office Safety Coordinators or Site Safety Coordinators as part of their training.

Business Group site managers and supervisors will receive agency inspection procedure training as part of the BG HSE training program.

Project employees will receive an overview on agency inspections as part of the site-specific FSI or HSP orientation.

8.0 Forms, Permits and Checklists

There are no forms, permits, and checklists for this procedure



9.0 References

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR Part 1903, Inspections, Citations, and Proposed Penalties
- U.S. Environmental Protection Agency, Compliance and Enforcement Web Page, <http://www.epa.gov/compliance/index.html>

9.0 Attachments

There are no attachments for this procedure.

10.0 Revision Log

Revision	Date	Description	Approved by:
1.0	11-26-2007	Jeff Stumpf – Updated HSE Standard of Practice 201 to Standard Operating Procedure. Added HSE-104 Standard of Practice into this SOP, and archived the Standard of Practice.	
2.0	5-18-2011	Angelo Liberatore/ Jim Kelly – Updated roles and responsibilities, policy and new enforcement section.	



Bloodborne Pathogens

Enterprise Standard Operating Procedure HSE -202

1.0 Purpose

This Enterprise HSE Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must comply with to limit exposure to blood and other potentially infectious materials to prevent transmission of bloodborne pathogens (BBP) such as hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

1.1 References

The following regulations were referenced to prepare this Enterprise SOP:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1030, Bloodborne Pathogens

2.0 Scope and Application

2.1 Scope

This SOP describes the requirements for implementing a bloodborne pathogens exposure control plan, training and informing employees, and offering HBV vaccine and confidential medical examinations to exposed or potentially exposed employees.

2.2 Application

This SOP applies Enterprise-wide to all CH2M HILL Legal entities and Business Groups, and subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally, where employees could reasonably come in contact with blood or other potentially infectious materials.

This Enterprise SOP applies when:

- CH2M HILL Employees are expected to render first aid as a collateral duty in response to injuries resulting from workplace incidents, regardless of the company responsible for the operation (CH2M HILL, subcontractor, or third-party contractor).

Where state OSHA agencies may have more stringent requirements, contact the appropriate Responsible Health and Safety Manager (RHSM) from the business group (BG) to address these specific requirements.

For international operations, this SOP should be followed as a minimum requirement, but country-specific H&S regulations (e.g., from Canada, Australia, or European Union countries) shall prevail, and an applicable SOP should be developed to comply with specific H&S regulations.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standards of Practice and SOPs that are applicable to this Bloodborne Pathogen SOP are as follows:

- HSE SOP-113, Medical Monitoring

3.0 Definitions

3.1 Bloodborne Pathogens

Bloodborne pathogens are pathogenic microorganisms present in human blood that can cause disease. These pathogens include, but are not limited to, HBV and HIV.

3.2 Chlorine Bleach

Chlorine bleach (household bleach) is defined as a solution of 5.25 percent sodium hypochlorite diluted between 1:10 and 1:100 with water.

3.3 Contaminated

This term refers to the presence or reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

3.4 Contaminated Sharps

This is any contaminated object that can penetrate the skin, including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, refuse, and exposed ends of dental wire.

3.5 Exposure Incident

An exposure incident involves contact between eye, mouth or other mucous membranes, parenteral, or non-intact skin with blood or other potentially infectious materials that results from an employee performing a job duty.

3.6 Occupational Exposure

Occupational exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may occur as employees perform work.

3.7 Other Potentially Infectious Material (OPIM)

This is any human body fluid including cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, semen, vaginal secretions, or any other body fluid that is visibly contaminated with blood, such as saliva or vomitus. It also includes all body fluids in situations where it is difficult or impossible to differentiate between body fluids, such as during an emergency response, and any unfixed tissue (other than intact skin) from a human (living or dead).

3.8 Parenteral

Parenteral refers to piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

3.9 Potentially Infectious Material (PIM)

PIMs include materials visibly contaminated with blood, materials in situations where it is difficult or impossible to determine if blood contamination is present, and materials where blood contamination cannot reasonably be ruled out.

3.10 Regulated Waste

Regulated waste includes liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

3.11 Source Individual

Individuals, living or dead, whose blood or other potentially infectious material may be a source of occupational exposure to the employee.

3.12 Universal Precaution

Universal precaution is an approach to infection control whereby all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

4.0 Roles and Responsibilities

Listed below are the roles and responsibilities required to implement the company BBP program.

4.1 Project Manager (PM)

The PM will ensure the required resources are provided and the appropriate staff assigned to implement a BBP program. The PM will provide specific information to the RHSM to develop a BBP exposure control plan for project-specific tasks when needed.

4.2 Responsible Business Group Health and Safety Manager (RHSM)

The responsible BG Health and Safety Manager provides the technical support and guidance for projects involving BBP, produces a project-specific exposure control plan when required, lists the general requirements in the project Health and Safety Plan (HSP) or Field Safety Instruction (FSI), and conducts project H&S audits on the effectiveness of program.

4.3 Responsible Environmental Manager (REM)

The responsible BG Environmental Manager provides the technical support and guidance for projects generating BBP waste, lists the requirements in the project Environmental Plan (EP), and determines the disposal of regulated waste for offices or projects.

4.4 Safety Coordinator (SC)

The office or project Safety Coordinator (SC) is designated as the employee for providing first aid/ cardiopulmonary resuscitation (CPR), and ensures the requirements of the exposure control plan are implemented.

4.5 Facility or Office Manager (FOM)

The Facility or Office Manager ensures first-aid and BBP supplies are provided for their office and coordinates the exposure control plan with the office SC.

4.6 Safety Program Assistant (SPA)

The Safety Program Assistant schedules BBP training, vaccinations, and medical examinations, as well as maintaining training records and coordinating medical records with the Consulting Company Occupational Physician.

4.7 CH2M HILL Employees

All CH2M HILL employees who provide first aid must maintain their first-aid certification, receive BBP training, follow the exposure control plan requirements described in this SOP or HSP, FSI, or EP, and report any incidents that may have resulted in exposure to BBP.

5.0 Requirements

The following requirements described in this Enterprise SOP must be implemented.

5.1 Exposure Control Plan

- Employees expected to render first aid as a collateral duty in response to injuries resulting from workplace incidents fall within the exposure control plan requirements in this SOP. This includes SCs, individuals designated as certified in first aid and CPR on CH2M HILL projects, and individuals designated as certified in first aid and CPR on the CH2M HILL office phone directories. First-aid “Good Samaritan” acts such as assisting a coworker with a nosebleed or other minor first-aid assistance are not covered by this plan.
- An exposure control plan must be developed for projects where contact with PIM or OPIM is encountered or cannot reasonably be ruled out. Examples of projects that would fall under this requirement are waste characterization site sampling, sorting refuse, and janitorial or waste collection services where medical, dental, or biological waste would be encountered.

Note: This SOP previously included employees exposed to raw sewage. OSHA concluded that raw sewage is not in the scope of the bloodborne pathogen standard. CH2M HILL’s occupational physician supports this position. Employees exposed to raw sewage should have a current tetanus vaccination and wear personal protective equipment (PPE) to prevent contact.

5.2 Engineering and Work Practice Controls

To eliminate or minimize employee exposure to bloodborne pathogens, observe the following engineering and work practice controls. PPE shall also be used where the potential for occupational exposure remains, even after implementation of these engineering and work practice controls.

- Observe universal precautions to prevent contact with blood or other PIM. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be PIM.
- Consider all sharps to be contaminated and PIM.

- Always wash your hands and face with soap and running water after contacting PIM. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes. When antiseptic cleansers or towelettes are used, always rewash your hands and face with soap and running water as soon as available. Do not consume food or beverages until after thoroughly washing your hands and face.
- Decontaminate all potentially contaminated equipment and environmental surfaces with chlorine bleach as soon as possible.
- Use a chlorine bleach solution of 5.25 percent sodium hypochlorite diluted with 10 parts water for decontaminating equipment or environmental surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area. Refer to Attachment 1: Summary of PPE and Decontamination Agents and Section 5.3 below.
- Place regulated waste in containers that are closable; sized and constructed to contain all contents; and prevent leakage of fluids during handling, storage, transport or shipping. The container must be labeled with a biohazard warning label, included in Attachment 2, or color-coded. The container must be tightly closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping. Coordinate disposal of regulated waste with the appropriate REM.

5.3 PPE Requirements

PPE is used to prevent exposure to BBP and is provided to employees according to the task performed. PE is provided at no cost to the employee and can be obtained through company equipment warehouses or through vendors. Examples of PPE include the following:

- Latex inner gloves, PVC outer gloves, and puncture-resistant utility outer gloves
- Latex allergies must be taken into account and appropriate hypoallergenic latex gloves or medical-grade nitrile gloves may be used as a substitute.
- Safety goggles, glasses, or full face shields
- Air-purifying respirators equipped with HEPA filters
- Tyvek or cotton coveralls and rubber aprons

Employees expected to render first aid must be aware of the following:

- First aid kits will be equipped with a BBP Protection Kit.
- BBP kits contain gloves, masks, CPR protectors, biohazard disposal bags, antiseptic cleanser, splash-proof goggles, towels, wipes, and an absorbent powder to clean up spills.

5.4 Communication

- Employees with potential occupational exposure to blood or other PIMs must participate in CH2M HILL's Bloodborne Pathogens Training Program.
- All containers holding waste that may contain PIMs must be labeled with a biohazard warning label (Attachment 2).

5.5 Hepatitis B Vaccination

For vaccination to HBV prior to occupational exposure the following applies:

- After completing training and within 10 working days of assignment, HBV vaccine is offered to employees who may be exposed to PIMs. (Note: Employees who render first aid as a collateral duty receive the vaccine after exposure.)

- Employees who decline the HBV vaccine must sign the declination form (see Attachment 3) indicating they declined the vaccination. The completed form is forwarded to the appropriate SPA and placed in the employee's medical file.

For vaccination to HBV after rendering first aid, the following applies:

- An employee who renders first aid to an injured coworker and contacts blood or other body fluids without using appropriate PPE such as gloves, or who renders CPR without a mouth shield is considered exposed to PIMs and will be offered the HBV vaccination series.
- If the employee declines vaccination, the employee must sign a declination form (see Attachment 3).

The process to receive the HBV vaccination is as follows:

- Once authorization is obtained, the appropriate SPA will schedule the vaccination with the local medical provider.
- An employee who has received the vaccination series, has demonstrated immunity, or for whom the vaccination is contraindicated should not receive the vaccine.

5.6 Post Exposure

CH2M HILL will provide employees exposed to BBP with a confidential medical examination. This examination includes the following procedures:

- Employee notifies supervisor
- The exposure is documented using the Incident Report Form (IRF)
- The exposed employee's and the source individual's blood is tested (with consent)
- Administer post-exposure prophylaxis
- Evaluate any reported illness

If the exposed employee consents to blood collection but does not give consent for testing, the sample will be preserved for 90 days. The employee can give consent any time during the 90 days.


If the source individual does not consent to testing, CH2M HILL will establish that consent cannot be obtained. If consent to collect the blood is obtained but consent to test is not, the blood sample will be preserved for 90 days. If within 90 days the source individual agrees to testing, the blood will be tested. Results of the source individual's testing are made available to the exposed employee's physician.

Within 15 days of the completed examination, CH2M HILL will verify that the employee has been informed of the results.

6.0 Training

Employees must receive BBP training at the time of initial assignment and at least annually thereafter. BBP training is completed online on the HSE web site. Additional training may be required if a task is modified or new procedures are instituted that affect the employee's exposure.

7.0 Revision Log

Revision	Date	Written by	Approved by
1	03/19/2007	Jeff Stumpf	

8.0 Attachments

Attachment 1: [PPE Summary and Decontamination Agents](#)

Attachment 2: [Biohazard Warning Label](#)

Attachment 3: [Hepatitis B Vaccine Declination](#)

Attachment 1: PPE Summary and Decontamination Agents

Attachment 1

**SUMMARY OF PPE AND DECONTAMINATION AGENTS
(USED TO REDUCE EXPOSURES TO BLOODBORNE PATHOGENS)**

Location and Activity	Gloves	Body	Foot	Face, Eyes, Nose	Decontamination Agent
Render first aid/CPR, clean spilled blood	Latex gloves provided in bloodborne pathogen protection kit	Normal work attire; however, take care to avoid contaminating clothing with victim's blood	Normal work attire	Mouth shield, eye goggles, mask as provided in bloodborne pathogen protection kit	Use powder and antiseptic wipes provided in bloodborne pathogen protection kit

Attachment 2: Biohazard Warning Label



Attachment 3: Hepatitis B Vaccine Declination

Hepatitis B Vaccine Declination

The Occupational Safety and Health Administration (OSHA) requires the following declination form to be signed in the event that an employee declines hepatitis B vaccination. Complete the form and forward to the appropriate Safety Program Assistant (SPA).

"I understand that due to my occupational exposure to blood or other potentially infectious materials, I may be at risk of acquiring hepatitis B virus infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If, in the future, I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me."

Name (print): _____

Signed _____

Date: _____



[CLICK HERE FOR ATTACHMENTS](#)

Drilling

Enterprise Standard Operating Procedure HSE -204

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Business Groups, Regions and Legal Entities must comply with when performing drilling operations.

2.0 Scope and Application

2.1 Scope

This SOP does not apply to operations involving drilling for oil and gas. This SOP applies to all other forms of drilling including cable tool, rotary, geo-probe, roto-sonic, direct push and hollow-stem auger drilling.

2.2 Application

This SOP applies to the following CH2M HILL staff:

- Employees working adjacent to drilling operations but not directly performing drilling-related activities. These employees must take precautions to avoid drilling hazards by being aware of and following the safe work practices in Section 5.1 of this SOP.
- Employees responsible for providing support functions related to drilling activities. These employees must be aware of the requirements contained in Section 5.2 of this SOP.
- Employees including Safety Coordinators (SCs) who may be responsible for providing safety oversight of a CH2M HILL subcontractor drilling operation. Staff including SCs must be aware of the drilling safety requirements provided in Section 5.3 of this SOP.
- Subcontractors performing drilling activities.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to drilling operations:

- HSE-112 [Manual Lifting](#)
- HSE-117 [Personal Protective Equipment \(PPE\)](#)
- HSE-206 [Electrical Safety](#)
- HSE-210 [Hand and Power Tools](#)
- HSE-216 [Traffic Control](#)
- HSE-218 [Hazardous Waste Operations](#)
- HSE-308 [Fall Protection](#)
- HSE-310 [Lockout/Tagout](#)

- HSE-314 [Welding and Cutting](#)
- HSE-315 [Hoists](#)
- HSE-316 [Rigging](#)
- HSE-408 [Waste Management: Analysis and Characterization](#)
- HSE-409 [Waste Management: Hazardous Waste](#)
- HSE-411 [Waste Management: Non- Hazardous Waste](#)
- HSE-413 [Waste Management Planning](#)
- HSE-416 [Waste Management: Wastewater and Stormwater](#)
- HSE-610 [Explosive Usage and Munitions Response](#)

3.0 Definitions

3.1 Cathead

A spool-shaped attachment on a winch around which rope for hoisting and pulling is wound

3.2 Cribbing

Wood or other material used to support a load from underneath. In drilling, timbers are often used to support, level, stabilize and distribute the load of drill rig footing.

3.3 Drilling

Drilling is defined as any man-made boring of holes in hard materials or an earth surface, usually by rotating abrasion or repeated blows.

3.4 Drilling-Related Activities

Activities conducted on or near the drill rig which directly support the drilling operation and result in exposure to drilling hazards.

4.0 Roles and Responsibilities

The roles and responsibilities provided in the HSE Roles and Responsibilities Core Standard apply to this SOP.

5.0 Requirements

5.1 Safe Work Practices

These safe work practices shall be followed by CH2M HILL employees who are not directly performing drilling-related activities but who may be exposed to drilling hazards, regardless of the company performing the drilling.

- Personnel shall stay clear of drill rigs during startup, positioning and set-up.
- Personnel shall stay clear of the rotating augers and other rotating components of drill rigs at all times.

- Personnel shall stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Personnel shall not wear loose-fitting clothing or other items such as rings or watches that could get caught in moving parts. Individuals with long hair should have it restrained.
- Personnel shall not smoke around drilling operations.
- Personnel shall wear the appropriate personal protective equipment (PPE). Minimum protection includes safety-toed boots, hard hats, safety glasses with side shields and hearing protection as described in the *Personal Protective Equipment SOP*, [HSE-117](#). Gloves, coveralls, and respirators may also be required based on the potential for chemical hazards [refer to the project's health and safety plan (HSP) or field safety instructions (FSI)].
- If drilling equipment becomes electrically energized, personnel shall not touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have the line de-energized prior to approaching the equipment.

5.2 CH2M HILL Support Functions of Drilling Operations

Depending on the contract with the client, subcontract with the drilling subcontractor, and the physical location of the drilling operation, CH2M HILL may be responsible for some of the following support functions regarding drilling operations. The party responsible for these functions shall be delineated in the contract, subcontract, and in the CH2M HILL project written safety plan. The requirements of this section are mandatory if CH2M HILL or our subcontractor is responsible for an identified support function.

5.2.1 Aquifer Designations

Determine if the aquifer is designated as a sole source aquifer, if the project is located near water wells or "well fields" supplying public or private water systems, or if the project will require withdrawals of large amounts of water. The Business Group Environmental Manager (BGEM) can determine if these conditions require a permit (see Section 7.0).

5.2.2 Location of Utilities

The location of underground and overhead utilities and underground installations shall be identified before drilling is permitted. Many states and countries have a utility one-call phone number for locating underground utilities and for required pre-notification of drilling activities. The national one-call number is "811." Online, go to www.call811.com.

5.2.3 Waste Management

Refer to the *Waste Management Planning SOP*, HSE-413 for Waste Management Plan requirements and guidance on budgeting for waste containment, transport and disposal.

5.2.3.1 Drilling at Non-Hazardous Waste Sites

Drill cuttings and purge water from uncontaminated soil or groundwater shall be managed in accordance with the *Non-hazardous Waste Management SOP*, [HSE-411](#) and the *Wastewater/Storm Water SOP*, [HSE-416](#).

5.2.3.2 Drilling at Hazardous Waste Sites

The Business Group Environmental Manager (BGEM) shall be consulted on proper evaluation, disposal, and decontamination procedures involving potential hazardous waste.

- All wastes generated shall be evaluated for appropriate disposal (see SOPs *Waste Management: Analysis and Characterization*, [HSE-408](#); and *Waste Management: Hazardous Waste*, [HSE-409](#)).
- If drilling involves hazardous materials, no potentially contaminated equipment shall be permitted to leave the work site. Refer to the *Hazardous Waste Operations SOP*, [HSE-218](#) for decontamination procedure requirements.

5.2.4 Drilling at Ordnance Explosives or Unexploded Ordnance Sites

If the project site is suspected of munitions or explosives of concern (MEC) contamination, the requirements of the *Explosives Usage and Munitions Response (MR) SOP*, [HSE-610](#) shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. If MEC contamination is suspected, the following procedures will be implemented, at a minimum:

- Drilling operations on munitions response (MR) sites will not be conducted until a complete plan for the site is prepared and approved by the CH2M HILL Environmental Services Business Group UXO Safety Officer. MEC avoidance must be conducted during drilling operations on known or suspect MR sites.
- The UXO team will identify and clearly mark the boundaries of a clear approach path for the drilling crews, vehicles, and equipment to enter the site. This path will be, at a minimum, twice the width of the widest vehicle. No personnel will be allowed outside any marked boundary.
- If MEC is encountered on the ground surface, the UXO team will clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
- The UXO team will conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of MEC that may be in the subsurface. If a magnetic anomaly is encountered, it will be assumed to be MEC and the approach path will be diverted around the anomaly. Only UXO personnel will operate the appropriate geophysical instrument and identify MEC.
- An incremental geophysical survey of the drill hole location(s) will be initially accomplished by the UXO team using a hand auger to install a pilot hole. If MEC is encountered or an anomaly cannot be positively identified as inert material, project sampling personnel will select a new drill hole location.

- Once a drilling site has been surface cleared and a pilot hole established as described above, the drilling contractor will be notified that the site is available for subsurface drilling.

5.3 Drilling Safety Requirements

The following subsections are provided to inform the CH2M HILL staff, including the Safety Coordinator (SC), of established drilling safety requirements so that an appropriate level of safety oversight can be provided.

Responsibilities for HSE are expressly defined through the subcontract terms and conditions, and CH2M HILL's HSE practices in the field are determined based on these defined responsibilities. For more information, see the *Contracts and Subcontracts SOP*, [HSE-215](#).

Drilling subcontractors are responsible and accountable for implementing these requirements as well as requirements established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does **not** relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

If drilling outside the US or its territories, consult with the Responsible Business Group Health & Safety Manager for applicable regulations and guidelines.

5.3.1 General

- Only authorized or licensed personnel, based on state, territory, or country requirements, are permitted to operate drill rigs. Drilling subcontractors shall ensure that each drill rig operator is qualified to safely operate the specific equipment through appropriate training and/or experience and provide copies of documentation to CH2M HILL prior to beginning operation.
- A daily safety briefing/meeting shall be conducted with all drilling personnel to discuss the work planned for the day and the HSE requirements to be followed.
- The drill rig and associated equipment shall be inspected before being allowed on site, and each day before use, to ensure safe operational condition. This inspection should include, at a minimum, the “kill” switch, cathead, ropes, hoses, pressurized lines, operator controls, and drilling tools, and fluid leaks from the engine, transmission, and hydraulic systems, etc.
- The drilling subcontractor shall maintain a clean work area.

5.3.2 Safety Equipment

CH2M HILL shall provide personal protective equipment (PPE) only for its own employees as listed in the project's health and safety plan (HSP) or field safety instructions (FSI). Drilling subcontractors are responsible for providing all PPE necessary for their employees. Other safety equipment shall be provided as delineated in the subcontract and referenced documents.

Listed below is safety equipment required for drilling operations:

- Minimum PPE includes safety-toed boots, hard hats, safety glasses with side shields, gloves, and hearing protection.
- The drill rig shall be equipped with at least one fire extinguisher following drilling rig manufacturer's recommendations, or at a minimum, a 20 pound (9.1 kg) ABC.

Listed below is safety equipment that may be required for drilling operations:

- Air monitoring instruments shall be provided if the potential for a hazardous atmosphere exists within the drilling location.
- Reflective/high-visibility safety vests shall be worn when personnel are exposed to public vehicular traffic or as required by the project specific health and safety plan (HSP) or field safety instructions (FSI). (see *Traffic Control SOP*, [HSE-216](#)).
- PPE for body protection (such as specialized gloves, coveralls, or chemical resistant boots or boots covers, etc.) and respirators may be needed when chemical hazards exist.
- 100 percent fall protection is required anytime an employee is working from an unprotected elevation of six (6) feet (1.5 m) or more above the ground or next level. In addition, the use of fall protection equipment may be required for exposures less than six (6) feet (1.5 m) if equipment or materials below the employee present a hazard (see *Fall Protection SOP*, [HSE-308](#)).

5.3.3 Buried Utility Locates and Overhead Utility Clearances

- The location of underground utilities such as electric, fuel, water, cable, telephone, and sewer (either in service or abandoned), and underground installations such as foundations, underground storage tanks, piping, and any other structures shall be identified before drilling is permitted.
- A 360 degree visual observation must be conducted to identify potential utilities; and an independent utility locate service shall be used to verify location of utilities using instrumented locate technology. Follow the project-specific health and safety plan (HSP) or field safety instructions (FSI)
- Utility companies and/or installation owners shall be contacted for exact locations of their equipment. Interviews with appropriate owner personnel and review of available drawings shall be conducted.
- When the exact location of the underground utility cannot be determined, hand digging, air knifing or other acceptable means such as pressurized water jet excavation, vacuum extraction, or hand augering for locating the underground installations shall be used to expose the utilities before drilling.
- Safe clearance distances shall be maintained between overhead power lines and any part of the drill rig unless the power lines have been de-energized and grounded or where insulating barriers have been installed to prevent physical contact. To avoid physical contact and potential arcing from the power line to the drill rig, rigs shall remain at least 10 feet (3.05 m) from overhead power lines for voltages to ground of 50 kV or less and 10 feet (3.05 m) plus 4 inches (10.2 cm) for every 10 kV over 50 kV. When it is difficult for

the drill rig operator to maintain the safe clearance distance, a person shall be designated to observe the clearance and warn the operator.

- It may be necessary for the subcontractor to contact the utility company to de-energize and ground the power lines when safe clearance distances cannot be maintained from overhead lines.

5.3.4 Drill Rig Placement

- Drilling subcontractors shall determine the safest drilling location based on topography and location of utility lines, both underground and overhead.
- In areas with known Karst topography, geophysical remote sensing may be used to pinpoint the location of hidden sinkholes. This is of particular importance for the protection of existing or planned drilling operations. Detailed elevation mapping to find topographic depressions and ground penetrating radar can be used for the identification of incipient sinkhole locations.
 - An alternative is to have the field geologist visually inspect the proposed drill sites to see if they are located within depressions. In areas of obvious topographic depressions, a geophysical pre-survey must be conducted prior to drilling.
- Drilling pad preparation may be required, particularly on steep slopes, and in areas that are wet, covered with dry, dead grass or weeds or where the ground is soft. Clean fill or gravel can be brought in to cover areas with surface contamination and to construct a relatively level work surface. Care should be taken in constructing pads if extensive cutting into existing slopes or surfaces is required to level the area. Areas in which extensive fill is required should be avoided. Compaction is recommended if significant amounts of fill are needed.
- The drill rig shall be leveled and stabilized with jacks and adequate cribbing before raising the mast and during drilling operations. Cribbing materials shall be capable of supporting the weight of the rig. Care should be taken in muddy, soggy soils, or partially frozen areas. Flat, stable working surfaces must be ensured when working on the kind of ground. Guy wires should be used to improve stability if the rig is located in an area subject to gusty winds.
- If drilling operations are conducted in areas where active vehicular traffic is present, private or public, the requirements of the *Traffic Control SOP*, [HSE-216](#), shall be followed.
- When drilling in an enclosed or restricted area that has limited maneuverability, such as inside a building or in an alley between multistory buildings, the following procedures will be implemented:
 - When using internal combustion engines, such as trucks, compressors, pumps, etc., hazardous atmospheres present a potential hazard. The assessment and corrective actions are the same as for a confined space. A system for extracting the engine's exhaust must be implemented in all indoor drilling.
 - When moving large equipment within an enclosed or restricted area, a spotter shall be used. The spotter and equipment operator must use standard hand signals for

communication and spotters shall never position themselves between the equipment and a fixed object such as walls or equipment.

- When drilling through or traveling over a manmade structure, verify that the floor loading capacity can support the drilling equipment and is adequate for the entire path of travel.
- Drilling work area shall be demarcated to prevent unauthorized individuals from entering the work area.
- Individuals working in areas adjacent to the drilling operations must be notified prior to beginning drilling operations.

5.3.5 Drill Rig Travel

- The drill rig shall be shut down and the mast lowered and secured prior to moving.
- All tools and equipment shall be securely stowed before the drill rig is moved.
- Only personnel in the drill rig cab, wearing a seat belt, are permitted to ride the rig.
- A backup alarm or spotter shall be used when backing the drill rig.
- A spotter shall be used when backing the drill rig in tight or restricted areas and in areas with low clearance.
- Safe clearance distances shall be maintained while traveling under overhead power lines with the mast lowered - 4 feet (1.2 m) for voltages less than 50 kV. If the voltage is higher than 50 kV, the clearance shall be increased 4 inches (10 cm) for every 10kV above that voltage. When determining safe clearances during movement, the sag of the overhead lines and the effect of wind forces must be considered.
- A minimum safety distance shall be maintained by all staff any time when the rig is traveling. The minimum safety distance to maintain should be equal to 1.5 times the length of the drill rig or the vehicle transporting it. Avoid traveling down slope when a rig is moving.

5.3.6 Emergency – Contact with Overhead or Underground Electrical Lines

- To prevent electrocution, the human body must not come in contact with the drill rig and the ground at the same time.
- Under most circumstances the operator and other personnel in the seat of the vehicle should remain seated and not leave the vehicle. They must not move or touch any part, particularly a metallic part, of the vehicle or drill rig.
- If it is determined that the drill rig should be vacated, all personnel must jump clear and as far as possible from the drill rig.
- Do not approach personnel close to or in contact with the drill rig.

5.3.7 Drill Rig Operation

- The drill rig shall be operated in accordance with the operators' manual from the manufacturer.

- Personnel shall stay clear of sides and rear of the drill rig (except the operator) while the mast is being raised.
- The drill rig shall be provided with a “kill” switch that, when activated, will shut down the rig. The switch should be clearly identified and tested daily to confirm operational status. All drilling crew members should be made aware of the location and purpose of this switch which must be in reach of the operator when at the operator controls.
- All machine guards shall be in place while the rig is in operation.
- The rope, wire rope, or cable on the drill rig shall never be wrapped around any part of the body.
- Pressurized lines and hose connections shall be secured together to prevent whipping. These connections should be inspected daily.
- The drill rig should not be operated during severe inclement weather such as during lightning storms, high winds, or severe rain. The mast should be lowered during these conditions.
- When the potential exists for hazardous atmospheres to develop within the drilling location, air monitoring shall be conducted to ensure it is safe to continue drilling operations (refer to the project’s written safety plan).
- The drill gear boxes (transmission for rotary drive, feed control, etc.) shall be placed in neutral while an operator is not at the controls. The operator shall shut down the rig engine prior to leaving the immediate vicinity of the drill rig.

5.3.8 Drill Rig Site Closure

At the end of the day or upon project completion, the drilling work area should be left in a safe condition. The following procedures shall be implemented:

- All ground openings, including bore holes and depressed tire marks, shall be filled in even with the existing grade, or barriers placed to keep unauthorized individuals, including the public, from accessing the openings.
- All tools, cables, and other equipment associated with the drilling operations shall be properly stored and secured to prevent unauthorized individuals from operating equipment or tripping.
- All vehicles shall be locked, windows closed, and keys removed.

5.3.9 Drill Rig Maintenance

- The drilling contractor is to verify that the equipment has documented corrective and preventive maintenance per the manufacturer’s recommendations and the drilling company’s maintenance program. Records must be on-site or readily available for review by CH2M HILL upon request.
- Components found to be in defective condition, either during inspections or during rig operation should be repaired immediately.

- Rig maintenance shall only be performed after appropriate lockout/tagout procedures have been implemented. See the *Lockout/Tagout SOP*, [HSE-310](#).
- The cathead should be kept clean and free of rust, oil, and grease. The cathead should be cleaned with a wire brush if it becomes rusty. If the rope "grabs" the cathead or otherwise becomes tangled in the drum, the operator should release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear.
- Clean, dry, and sound rope should be used. A wet or oily rope may "grab" the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast where the rope will often break, releasing the tools. If the rope does not break, personnel should be instructed to stay clear of the drill rig until the operator cautiously turns off the drill rig engine and appropriate action is taken to release the tools, including safe release of stored energy from tension on the rope. The operator should keep careful watch on the suspended tools and should back away after turning off the engine. The rope should always be protected from contact with all chemicals. Chemicals can cause deterioration of the rope.
- Drilling operations may require repair or disentanglement of wire rope on the mast while it is raised. Fall protection shall be used when personnel are exposed to a fall of 6 feet (U.S.) or 1.5 m or greater. See *Fall Protection SOP*, [HSE-308](#).
- Augers should be cleaned only when the drill rig is in neutral and the augers have stopped rotating. Hands or feet shall not be used to move cuttings away from the auger.
- All work areas, platforms, walkways, scaffolding, and other access ways should be maintained free of materials, debris, obstructions, and substances such as ice, grease, or oil.

5.4 Subcontractor HSE Oversight

As described in the *Contracts and Subcontracts SOP*, [HSE-215](#), responsibilities for HSE are expressly defined through the subcontract terms and conditions, and CH2M HILL's HSE practices in the field are determined based on these defined responsibilities. Consistent with HSE-215, CH2M HILL drilling subcontractors must determine how to drill safely and in compliance with applicable HSE regulations and industry standards, and how to correct deficiencies. CH2M HILL employees shall not direct the means and methods of safe drilling operations or details of corrective actions.

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HSE regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

5.4.1 Subcontractor Selection

Drilling subcontractors are selected as described in the *Subcontractor, Contractor, and Owner SOP*, [HSE-215](#). The "Subcontractor Safety Procedure Criteria - Drilling" presented in Attachment 1 provides the minimum criteria for drilling safety procedures. These criteria

shall be used by the HSE staff to review submitted subcontractor drilling procedures when CH2M HILL oversight is required by HSE-215.

5.4.2 Competent Person Requirements

Drilling subcontractors shall provide a competent person to perform daily inspections of the drill rig and associated equipment and to oversee all drilling activities. The competent person shall be capable of identifying drilling hazards and have the authority to take corrective actions to eliminate the hazards.

5.4.3 Personal Protective Equipment

Drilling subcontractors are responsible for providing all PPE necessary for their employees. Other safety equipment shall be provided as delineated in the subcontract and referenced documents.

5.4.4 Training and Medical Surveillance

Subcontractor training and current medical examinations (when required) shall be verified, including copies maintained in CH2M HILL's project file, prior to the start of field operations.

6.0 Training Requirements

Drill operators and rig hands must be trained on the specific drill rig to be operated in accordance with the drill rig manufacturer's requirements. Additionally, there may be training requirements based on the location of the drilling activities.

- Hazardous waste training is required when working on hazardous waste projects.
- Munitions and Explosives of Concern (MEC) hazard training is required when working on projects where known or suspected MEC could be present.
- Waste management training is required where waste streams (e.g., drill cuttings, purge water, decontamination water, and contaminated personal protective equipment) will be generated.

Site-specific training requirements are outlined in the *HSE Training Program SOP*, [HSE-110](#) and will be addressed in the project's health and safety plan (HSP) or field safety instructions (FSI). Drilling subcontractors are responsible for complying with all applicable health, safety and environment (HSE) training requirements and for providing the training necessary to complete their tasks safely.

7.0 Forms, Permits and Checklists

The following permits and notifications may be required, depending on state or local requirements. The Business Group Environmental Manager (BGEM) should be contacted to determine applicability.

- Well driller license/certification or Professional Geologist requirements. Subcontractors are required to submit copies of licenses/certifications prior to subcontract award and

before new personnel fill these positions. Documentation is to be maintained in CH2M HILL's project file.

- Well installation or abandonment notification. Submittal of well log or inventory may be required after installation or abandonment.
- A groundwater withdrawal permit may be required for large water withdrawals in some states.
- A "dig permit" may be required at certain client facilities.

The "HSE Self-Assessment Checklist – Drilling" in Attachment 2 may be used to verify subcontractor's and CH2M HILL compliance with safety procedures, established practices, regulations, and industry standards. The Business Group Health and Safety Lead specifies the frequency in which this checklist should be completed by the Safety Coordinator (SC) and provides this information in the project's written health and safety plan (HSP) or field safety instructions (FSI). The Business Group Health and Safety Lead may also use this checklist when performing audits at CH2M HILL projects, including subcontractor's activities.

8.0 References

There are no Occupational Safety and Health Administration (OSHA) regulations specific to drilling activities. However, OSHA standards referenced include:

- 29 CFR 1910 Subpart I – Personal Protective Equipment
- 29 CFR 1910.212 - Machine Guarding
- 29 CFR 1910.333(c)(3) – [Working near] Overhead Lines
- 29 CFR 1926.550 – Cranes and Derricks
- 29 CFR 1926.251 – Wire Ropes, Chains and Ropes

Drilling Safety Guide. National Drilling Federation. (1985)

9.0 Attachments



Attachment 1: [Subcontractor Safety Procedure Criteria - Drilling](#)

Attachment 2: [HSE Self-Assessment Checklist - Drilling](#)

Attachment 3: [Job Hazard Analysis](#)

10.0 Revision Log

Revision	Date	Description	Prepared By:	Approved By:
1	3/18/09	Revised existing information in archived SOP Converted existing information	Peggy Kerchner/ Bret Clausen	

Revision	Date	Description	Prepared By:	Approved By:
		<p>to new template</p> <p>Deleted existing Appendix 1 – Relevant Regulatory Requirements</p> <p>Reviewed/Revised other two existing attachments to follow new format and include new information</p>		
2	02/10/11	<p>Consolidated buried utility locates and overhead utility clearances into Section 5.3.3 and added criteria in Attachment 2 – Self-Assessment Checklist, Section 5.3.3</p> <p>Added requirement for Karst topography in Section 5.3.4, Drill Rig Placement, and in Attachment 2 – Self-Assessment Checklist, Section 5.3.4</p>	Angelo Liberatore/ Jeff Stumpf	

Attachment 1: Subcontractor Safety Procedure Criteria - Drilling

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor safety procedures. Subcontractors are expected to address the following items, at a minimum, in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Drilling Safety Procedures:

1. Provide name and qualifications of the drilling “competent person” responsible for drilling (years and type of experience, training background, etc.):
2. Describe drill rig and equipment inspection criteria or procedures (frequency of inspections, visual vs. written inspections, items that are inspected):
3. Describe methods of identifying underground utilities (contacting utility companies, third party instrumented locates, drawing review, personnel interviews, detection equipment, etc.):
4. Describe methods of avoiding contact with overhead power lines (de-energizing and grounding, insulating, safe clearance distances):
5. Describe methods to identify hazardous atmospheres and controls used to eliminate (detection equipment and controls):
6. Describe leveling and stabilizing methods for drill rig (drilling pad preparation, jacks, cribbing, guy wires):
7. Verify that rig equipment is in good operational condition (including “kill” switch, cathead, ropes, pressurized hoses and lines, operator controls, machine guards, and drilling tools):
8. Describe procedures for operating in inclement weather, including lightning, high winds, severe rain storms:
9. Describe other safe work practices for equipment operation (drill rig, equipment, tools, rig transportation, rig travel):
10. Describe on-the-job maintenance procedures, including lockout/tagout:
11. Describe safe work practices for other activities to be performed during this project (use of ladders, fall protection, use of electrical power tools, use of personal protective equipment, etc.):
12. Describe methods for disposal of non-hazardous drill cuttings and purge water (including accumulation, transport, and disposal):
13. If hazardous waste project, provide documentation of hazardous waste worker training and medical surveillance records for all project personnel (40-hour or 24-hour training, 8-hour refresher training) and describe methods of hazardous waste management (including accumulation, transport, and disposal):
14. Submit a copy of drilling license/certification and drill rig permit:
15. Describe methods and responsibilities for submittal of notifications and logs:

16. Complete the Waste Subcontractor Qualification Form for each proposed transport and disposal facility:

17. Describe procedures for drilling site clean-up upon job completion.

If drilling in areas with known or potential Munitions and Explosives of Concern (MEC) hazards:

18. Provide documentation of UXO qualifications, hazardous waste worker training, medical surveillance records, and drug testing for all project personnel (Technical EOD/UXO training certificate, 40-hour or 24-hour training, 8-hour refresher training):

19. Describe procedures for MEC avoidance, identification and marking the boundaries of a clear approach path and work site for the sampling crews, vehicles, and equipment to enter the site:

20. Describe the procedures for drilling and monitoring, and the process for encountered MEC.

Attachment 2: HSE Self-Assessment Checklist - Drilling

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to drilling hazards, 2) CH2M HILL staff are providing support function related to drilling activities, and/or 3) CH2M HILL oversight of a drilling subcontractor is required.

Safety Coordinator may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered being imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to drilling hazards (complete Section 1).
☐ Evaluate CH2M HILL support functions related to drilling activities (complete Section 2)
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling safety requirements (complete entire checklist).
 Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in SOP HSE-204.

SECTION 1 - SAFE WORK PRACTICES - 5.1

	Yes	No	N/A	N/O
1. Personnel cleared during rig start-up, positioning and setup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Personnel clear of rotating parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Personnel not positioned under hoisted loads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Loose clothing and jewelry removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Smoking is prohibited around drilling operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel wearing appropriate personal protective equipment (PPE), per HSP or FSI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Personnel instructed not to approach equipment that has become electrically energized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2 - SUPPORT FUNCTIONS - 5.2**AQUIFER DESIGNATIONS (5.2.1)**

8. Aquifer designations determined and BGEM consulted when required. ☐ ☐ ☐ ☐

LOCATION OF UTILITIES (5.2.2)

9. Location of underground and overhead utilities and structures identified ☐ ☐ ☐ ☐
 10. Utility company contacted to de-energize/ground power lines due to clearance ☐ ☐ ☐ ☐

SUPPORT FUNCTIONS – 5.2 (Continued)				
	Yes	No	N/A	N/O
WASTE MANAGEMENT (5.2.3)				
11. Drill cuttings and purge water managed and disposed properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Wastes generated evaluated for proper disposal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Appropriate decontamination procedures being followed, per project's written safety plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILLING AT ORDNANCE EXPLOSIVES OR UNEXPLODED ORDNANCE SITES (5.2.4)				
14. MEC plan prepared and approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. MEC avoidance provided, routes and boundaries cleared and marked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Initial pilot hole established by UXO technician with hand auger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Personnel remain inside cleared areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SECTION 3 - DRILLING SAFETY REQUIREMENTS -5.3				
GENERAL (5.3.1)				
18. Only authorized personnel operating drill rigs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Daily safety briefing/meeting conducted with crew	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Daily inspection of drill rig and equipment conducted before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Good housekeeping maintained on and around rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAFETY EQUIPMENT (5.3.2)				
22. Safety-toed boots, hardhats, safety glasses w/side shields, gloves and hearing protection worn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Drill rig equipped with fire extinguisher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Air monitoring instruments provided when required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Reflective/high visibility vests worn when required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. PPE for protection from chemical hazards worn if required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BURIED UTILITY AND OVERHEAD CLEARANCE (5.3.3)				
27. Location of underground utilities and structures identified, including third party locate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. 360° visual observation conducted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Hand digging, air knifing conducted to expose utilities before drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Safe clearance distance maintained from overhead power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Power lines de-energized and grounded when safe distances cannot be maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG PLACEMENT (5.3.4)				
32. Drilling pad established, when necessary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Drill rig leveled and stabilized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Additional precautions taken when drilling in restricted areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. In Karst topography use remote sensing or geologist review for sinkholes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG TRAVEL (5.3.5)				
36. Rig shut down and mast lowered and secured prior to rig movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Tools and equipment secured prior to rig movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Only personnel seated in cab wearing a seat belt are riding on rig during movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Backup alarm or spotter used when backing rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Spotter used when backing rig in tight or restricted areas or when low clearances exist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Safe clearance distance maintained while traveling under overhead power lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EMERGENCY – CONTACT WITH OVERHEAD OR UNDERGROUND ELECTRICAL LINES (5.3.6)				
42. Personnel understand emergency procedures in the event of contact with overhead or underground electrical lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG OPERATION (5.3.7)				
43. Drill rig operated in accordance with operators' manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Personnel clear while mast is being raised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Kill switch clearly identified, operational, and in reach of the operator control station	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

HSE Self-Assessment Checklist - Drilling

SECTION 3 - DRILLING SAFETY REQUIREMENTS - 5.3 (Continued)

46.	All machine guards are in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47.	Rig ropes never wrapped around any part of the body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48.	Pressurized lines and hoses secured to prevent whipping hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49.	Drilling operation stopped during inclement weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50.	Air monitoring conducted per written safety plan for hazardous atmospheres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51.	Rig gear boxes placed in neutral when operator not at controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52.	Operator shuts rig engine down prior to leaving the drill rig vicinity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG SITE CLOSURE (5.3.8)					
53.	Ground openings/holes filled or barricaded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54.	Equipment and tools properly stored	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55.	All vehicles locked and keys removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRILL RIG MAINTENANCE (5.3.9)					
56.	Rig properly maintained per drilling company's maintenance program and records on-site/available for review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57.	Defective components repaired immediately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58.	Lockout/tagout procedures used prior to maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59.	Cathead in clean, sound condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60.	Drill rig ropes in clean, sound condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61.	Fall protection used for fall exposures of 6 feet (U.S.) 1.5 m or greater	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62.	Rig in neutral and augers stopped rotating before cleaning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63.	Good housekeeping maintained on and around rig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FORMS/PERMITS AND CHECKLISTS (7.0)					
64.	Driller license/certification obtained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65.	Well development/abandonment notifications and logs submitted and in project files	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66.	Groundwater withdrawal permit obtained where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67.	Dig permit obtained where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 3

Complete this section for all items checked “No” in previous sections. Deficient items must be corrected in a timely manner.

[illegible]

Auditor: _____ Project Manager: _____

Attachment 3 — Job Hazard Analysis

Company Name: CH2M HILL		Project Name/ #:
Work Activity/Task: Drilling		Principal Contractor: CH2M HILL
Date:		Note: Sign off to be provided at Tool Box talk
Prepared by:		Supervisor:
Signature:		Safety Coordinator (SC):
Plant & Equipment Required: - Machinery: maintenance checks provided by subcontractor - Operator: suitably qualified and competent, with health, safety, and environment (HSE) training		Training Requirements [(in addition to those in project's health and safety plan (HSP) or field safety instructions (FSI): - OHS Construction Induction - Waste Management for waste streams and materials
Job Step	Potential Hazard	Controls
Site Setup including drill rig travel	Electrocution	<ul style="list-style-type: none"> • Location of utilities and underground structures identified including third party locate • Power lines de-energized when safe distances cannot be maintained • Lower mast and secure during travel • Review emergency procedures for contact with live electrical lines • Daily briefing • Path of travel reviewed for obstacles, stability and load capacity
	Struck by machinery/objects	<ul style="list-style-type: none"> • Tools and equipment secured prior to rig movement • Ensure stable ground and adequate footing for machinery. Adequate ground preparation to support loads and accommodate waste materials. • Establish drill pad if necessary • Drill rig level and stabilized • Personnel clear while mast is raised • No personnel under raised loads • Back-up alarm or spotter when reversing rig • Use spotter when reversing rig in tight quarters, confined areas or with low clearances. • Use of appropriate personal protective equipment (PPE) where required. Safety boots, hard hats, safety glasses with side shields, gloves and hearing protection are mandatory.

Job Step	Potential Hazard	Controls
Site Setup including drill rig travel	Struck by vehicles	<ul style="list-style-type: none"> Follow traffic control plan Wear high-visibility warning vests
	Caught between moving/rotating parts	<ul style="list-style-type: none"> Personnel cleared during rig start-up, positioning and set-up Kill switch installed, clearly identified, operational and in reach of the operator Machine guarding in place Stay clear of rotating parts No loose-fitting clothing, rings, watches, etc.; long hair to be restrained close to the head. Do not clean cuttings or debris away for auger until gear box is in neutron and rotation has stopped – never use hand or foot to clear away cuttings or debris.
	Dermal or inhalation exposure to contaminants	<ul style="list-style-type: none"> Investigate history of area; determine nature and degree of contaminants that could be present Conduct air monitoring for potential hazardous atmospheres as described in the project's written safety plan. Respirators when chemical hazards exist. Use respirators and other PPE as prescribed in the project's written safety plan
	Fire	<ul style="list-style-type: none"> No smoking around the drill rig Drill rig equipped with at least one fire extinguisher
	Falls	<ul style="list-style-type: none"> During travel, only personnel seated in cab with seat belt on are to ride on the rig vehicle Fall protection required at heights > 6ft.
	Injury due to inclement weather	<ul style="list-style-type: none"> Drill rig not to be operated in severe inclement weather such as lightning storms, high winds, or severe rain. Mast to be lowered in these conditions.
Drilling Activities	Electrocution	<ul style="list-style-type: none"> Location of utilities and installations identified Power lines de-energized when safe distances cannot be maintained Review emergency procedures for contact with live electrical lines Daily briefing

Job Step	Potential Hazard	Controls
Drilling Activities	Struck by machinery/objects	<ul style="list-style-type: none"> • Ensure stable ground and adequate footing for machinery. Adequate ground preparation to support loads and accommodate waste materials. • No personnel under raised loads • Defective components repaired immediately • Use of appropriate personal protective equipment (PPE) where required. Safety boots, hard hats, safety glasses with side shields, gloves and hearing protection are mandatory. • Always operate rig in accordance with manufacturers operating manual.
	Struck by vehicles	<ul style="list-style-type: none"> • Follow traffic control plan • Wear high-visibility warning vests
	Caught between moving/rotating parts	<ul style="list-style-type: none"> • Daily inspection of drill rig & equipment • Kill switch installed, clearly identified, operational and within reach of the operator • Personnel cleared during rig start-up • Non-essential personnel clear during rig operations • Machine guarding in place • Stay clear of rotating parts • No loose-fitting clothing, rings, watches, etc.; long hair to be restrained close to the head. • Hands or feet should not be used to move cuttings away from auger • Rig in neutral and augers stopped rotating before cleaning • Rig placed in neutral when operator not at controls • Pressurized lines and hoses secured from whipping hazards • Rig ropes never wrapped around any part of the body • Rig ropes in clean, sound condition • Cathead in clean, sound condition • Defective components repaired immediately • Always operate rig in accordance with manufacturer's operator manual.
	Dermal or inhalation exposure to contaminants	<ul style="list-style-type: none"> • Fugitive dust suppressed • Conduct air monitoring for potential hazardous atmospheres as described in the project's written safety plan. • Respirators when chemical hazards exist. • Use respirators and other PPE as prescribed in the project's written safety plan
	Fire	<ul style="list-style-type: none"> • No smoking around the drill rig • Drill rig equipped with at least one fire extinguisher

Job Step	Potential Hazard	Controls
Drilling Activities	Falls	<ul style="list-style-type: none"> • Fall protection required at heights > 6ft. • Ground openings/holes filled or barricaded • Good housekeeping maintained on and around rig
	Injury due to inclement weather	<ul style="list-style-type: none"> • Drill rig not to be operated in severe inclement weather such as lightning storms, high winds, or severe rain. Mast to be lowered in these conditions.
Drill rig maintenance	Struck by machinery/objects	<ul style="list-style-type: none"> • Lockout /Tagout procedures used prior to maintenance
	Caught between moving/rotating parts	<ul style="list-style-type: none"> • Kill switch installed, clearly identified, operational and within reach of the operator.



[Click here for attachments](#)

Electrical Safety

Enterprise Standard Operating Procedure HSE-206

1.0 Purpose

This Electrical Safety Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must be in compliance with when performing activities within the scope of this SOP.

This Electrical Safety Enterprise SOP provides information regarding the safe work practices for all CH2M HILL Legal Entities, BGs, employees, and subcontractors when exposed to common electrical hazards and when using electrical tools and equipment.

2.0 Scope and Application

This Enterprise SOP applies enterprise-wide to all CH2M HILL Legal Entities and BGs that operate in the United States (US) and internationally, their employees, subcontractors, and lower-tier subcontractors.

Some states Occupational Safety and Health (OSHA) plans may have more stringent requirements. Contact the appropriate responsible BG Health and Safety Manager (HSM) to address these specific requirements. This SOP should be used as a starting point for international operations; , country-specific health and safety (H&S) regulations (that is, Canada, Australia, etc.) shall prevail, and a country-specific SOP should be developed to comply with these specific H&S regulations.

This Electrical Safety Enterprise SOP applies when:

- CH2M HILL employees are required to use electrical tools and equipment or may be exposed to electrical hazards
- CH2M HILL provides oversight of a subcontractor's electrical safety activities.

CH2M HILL employees who are required to use lockout/tagout procedures during service or maintenance activities on electrically controlled equipment shall comply with the Lockout/Tagout SOP. CH2M HILL employees who are required to work on or near exposed energized electrical systems shall comply with the Energized Electrical SOP.

2.1 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to electrical activities:

- [Lockout/Tagout SOP HSE-310](#)
- [Energized Electrical SOP HSE-221](#)

3.0 Definitions

No definitions for this standard are necessary.

4.0 Roles and Responsibilities

The following sections outline the roles and responsibilities for individuals when following this procedure.

4.1 Business Group Health and Safety Leads

The BG H&S Leads are responsible for implementing this Electrical Safety Enterprise SOP for all projects in their BG. BG H&S Leads also however the authority to approve deviation from this standard to accommodate local requirements.

4.2 Project Manager

The CH2M HILL Project Manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the H&S management process. The PM has overall H&S management responsibility, but may delegate specific tasks to other project staff. The PM retains ultimate H&S responsibility for the project.

4.3 Site Manager

The CH2M HILL Site Manager (SM) is responsible for all field operations onsite and is typically the Construction Manager (CM), Site Superintendent, Site Supervisor, or Field Team Leader. The SM is directly responsible for implementing all aspects of the project H&S plan, as assigned by the PM.

4.4 Responsible Business Group HSM (RHSM)

The RHSM is the HSM assigned by the BG H&S Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the CH2M HILL project H&S plan, reviews subcontractor H&S plans and submittals, conducts project H&S audits, and provides H&S support and guidance to the project.

4.5 Site Safety Coordinator (SSC)

The Site Safety Coordinator (SSC) is either the SM, or is designated by the SM to implement the project H&S Plan. He or she has successfully completed all required SSC training. The SSC also serves as the CH2M HILL electrical competent person on the project. The SSC is also responsible for ensuring that cords, tools, and other equipment are inspected as required by this Electrical Safety Enterprise SOP.

4.6 Competent Person

A competent person is designated to oversee all electrical activities, including inspection and installation of electrical equipment. The competent person shall be capable of identifying electrical hazards and has the authority to take corrective actions to eliminate the

hazards. The SSC serves as the CH2M HILL electrical competent person when CH2M HILL employees are required to use electrical appliances or may be exposed to electrical hazards on the project.

4.7 Qualified Person

A qualified person is one who has the skills and knowledge related to the construction and operation of the electrical equipment and installation, and has received safety training on the hazards involved. A licensed electrician is typically the qualified person who installs, adjusts, repairs, or replaces electrical components or equipment in an electrical system.

4.8 Employees

All employees are responsible for safe work practices and for complying with this SOP and project H&S requirements.

5.0 Requirements

The following requirements outlined in this Electrical Safety Enterprise SOP must be implemented.

5.1 General Requirements

Electrical hazards are a common risk found on CH2M HILL project sites. Failure to recognize and follow safe work practices may result in serious injuries or fatalities.

- Only a qualified person, typically a licensed electrician, shall perform installation, adjustment, repair, or replacement of electrical tools and equipment.
- Only a qualified person may defeat an electrical safety interlock or a mechanical interlock that restricts access to electrical equipment. The interlock shall be returned to its standard position at the completion of work for which it was defeated.
- Before beginning work, qualified personnel shall determine, by inquiry, direct observation, or instruments, whether any part of an energized electric circuit, exposed or concealed, is so located that work performance may bring any person or tool into physical or electrical contact with the electric circuit. Qualified personnel shall post proper warning signs where such a circuit exists and advise employees of the location of such lines, the hazards involved, and the protective measures to be taken. Refer to HSE-221, *Energized Electrical*.
- Conductors and parts of electrical equipment that have been deenergized but not been locked or tagged out shall be treated as live parts.
- Areas under new installation or repair shall be sufficiently guarded with physical barriers and warning signs to prevent unauthorized entry. Only qualified personnel are permitted to enter high-voltage areas.
- When a protective device such as a circuit breaker trips or fails, an attempt shall be made to determine the cause of the trip or failure. An electrician shall be consulted if the cause is not apparent or if 240 volts or more is involved. One-time reset of the device is permitted if authorized by supervisory personnel and when no fault is suspected. Panels must be completely enclosed, with no energized parts exposed. A protective device shall

not be reset a second time unless the cause of the trip is understood and corrected, and unless the second reset has been authorized by supervisory personnel.

5.2 Subcontractor Procedures

Subcontractor H&S responsibilities are expressly defined through the subcontract terms and conditions. Subcontractors must determine how to perform operations in compliance with applicable H&S regulations and industry standards, and how to correct deficiencies.

CH2M HILL employees shall not direct the means and methods of subcontractor operations.

Subcontractors are responsible and accountable for implementing these requirements and any additional requirements established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of Health, Safety, and the Environment (HS&E) requirements. Subcontractors shall also be responsible for providing a competent person when required.

The "Subcontractor Safety Procedure Criteria – "Electrical Safety" presented in Attachment 1 provides the minimum criteria for electrical safety procedures. These criteria may be used by the HS&E staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor's operations.

The "HS&E Self-Assessment Checklist – "Electrical Safety" in Attachment 2 may be used to verify a subcontractor's compliance with established safe work practices, regulations, and industry standards.

5.3 Electric Power Tools and Extension Cords

The following requirements apply to the use of electric power tools and extension cords:

- Each employee using electrical power tools and extension cords must perform a visual inspection before each day's use of the cord set, attachment cap, plug, receptacle of cord or tool sets, and any tool or equipment connected by cord and plug, except cord and receptacles which are fixed in place and not exposed to damage. Equipment shall be checked for deformed or missing conductor and ground pins, insulation damage, and indications of possible internal damage. Damaged equipment will be tagged and removed from service.
- Electric power tools shall be operated and maintained according to manufacturers' instructions.
- Electric power tools shall be effectively grounded (ground wire and three-prong grounding plug) or be double insulated.
- Extension cords shall be heavy duty or industrial grade and shall be effectively grounded (ground wire and three-prong grounding plug).
- Extension cords shall not be used as a substitute for permanent wiring of a structure.
- Extension cords shall be covered, elevated, or protected from damage when passing through work areas. Sharp corners and projections shall be avoided. Extension cords that pass through doorways or other pinch points shall be protected from damage.

- Extension cords shall be neither concealed behind nor run through holes in walls, ceilings, or floors.
- Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.
- Working spaces, walkways, and similar locations shall be kept clear of extension cords so as not to create a trip hazard.
- In states, territories, or countries that require testing of power tools and electrical cords, the requirements of an assured grounding conductor program as presented in Section 5.6.2 of this SOP shall be followed.

5.4 Portable Lighting

Portable lighting refers to consumer-available lights equipped with electrical cord and plug. This type of lighting can be connected to extension cords or electrical outlets. Portable lighting is lighting that does not require electrical wiring to be installed to provide electricity for temporary lighting. The following requirements apply to the use of portable lighting:

- Portable lamps shall be wired with a flexible cord and an attachment plug of the polarized or grounding type.
- Portable lights shall not be suspended by their electric cords unless cords and lights are designed for suspension.
- Portable lights shall be protected from accidental contact or breakage.
- Portable electric lighting used in wet or other conductive locations shall be operated at 12 volts or less unless protected by Ground Fault Circuit Interrupters (GFCIs).

5.5 Overhead Power Lines

Any vehicle or mechanical equipment capable of having parts of its structure elevated near overhead power lines shall be operated so that a safe clearance distance is maintained. When it is difficult for the equipment operator to maintain the safe clearance distance, a person shall be designated to observe the clearance and warn the operator.

Equipment shall be maintained at least 10 feet from overhead power lines for voltages of 50 kilovolts (kV) or less and 10 feet plus a half inch for every 1 kV over 50 kV.

Safe clearance distance may be reduced under the following conditions:

- Overhead power lines that have been de-energized and grounded by the utility or owners of the lines do not require safe clearance distances unless dictated by the utility or owner. All power lines shall be considered to be energized until utility representatives or owners of the lines state that they are de-energized and grounded.
- If insulating barriers are installed to prevent contact with lines, and if the barriers are rated for the voltage of the line being guarded, the safe clearance distance may be reduced to a distance within the designed working dimensions of the insulating barrier.
- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 feet (1.2 meters [m]) for voltages less than 50kV, 10 feet (3 m) for voltages between 50 kV

and 345 kV, and 16 feet (5 m) for voltages greater than 345 kV. When determining safe clearances during movement, the sag of the overhead lines and the effect of wind forces must be considered.

Employees standing on the ground shall not contact any vehicle or mechanical equipment or any attachments unless one of the following conditions exists:

- The equipment is located such that no part of its structure can come closer to the line than the safe clearance distances permitted above.
- The employee is using protective equipment rated for the voltage of the power line.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location or within 10 feet (3 m) of the equipment where there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from the hazardous ground potentials that can develop from the grounding point.

If any vehicle or mechanical equipment becomes electrically energized, personnel shall not touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have the line de-energized prior to approaching the equipment.

5.6 Ground-fault Protection

To protect individuals from receiving an electrical shock due to a ground-fault, one of two ground-fault protection methods shall be implemented on all projects: (1) use of GFCIs or (2) implementing an assured equipment grounding conductor program.

5.6.1 Ground Fault Circuit Interrupters (GFCIs)

CH2M HILL has selected GFCIs as the standard method for protecting employees from the hazards associated with electric shock.

- GFCIs shall be used on all 120-volt, single phase 15 and 20-ampere receptacle outlets which are not part of the permanent wiring of the building or structure.
- Receptacles on a two-wire, single-phase, portable or vehicle-mounted generator rated not more than 5 kW, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with GFCI.
- Temporary power panels providing 120-volt service shall be equipped with GFCI circuit breakers for optimum personnel protection. The same level of protection is afforded by the use of GFCI receptacles.
- In cases where protection afforded by GCFI circuit breakers or GFCI receptacles is not readily available, portable plug-in GFCIs shall be used.
- GFCIs shall be tested by a competent person at least quarterly for proper operation. A record of testing shall be maintained in the project files identifying the following: (1) make or model, (2) serial number of unit, (3) date of inspection and inspection results including any defects found and final status.

- A GFCI polarity tester shall be used to ensure trip current values and to test any satellite receptacle downstream from the receptacle or breaker containing the GFCI.

5.6.2 Assured Equipment Grounding Conductor Program

An assured equipment grounding conductor program may be required under the following scenarios:

- GFCIs can not be utilized
- Client requires such a program to be implemented
- Business group decides to implement program in addition to GFCI protection

An assured equipment grounding conductor program, when used, shall cover all cord sets and receptacles that are not a part of the permanent wiring of the building or structure and equipment connected by cord and plug that are available for use by employees. This includes electrical hand tools, extension cords, electrically powered shop equipment, light plants, and all other temporary electrical circuits.

One or more competent persons will be designated as inspectors to test equipment. Each competent person designated as an inspector to test equipment shall be SSC qualified and trained. Inspectors will identify existing and predictable hazards in tools, cords, and other pieces of electrical equipment. They will also have the authority to take prompt, corrective measures to eliminate problems found. Any problem equipment which cannot be repaired immediately must be removed from service and tagged "Defective - Do Not Use" until repairs are made.

The designated inspector shall perform the following tests on all equipment covered under this program:

- Test all equipment grounding conductors for continuity; all conductors shall be electrically continuous.
- Test each receptacle and attachment cap or plug for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.
- Inspect all double-insulated tools and equipment for physical damage.

All required tests shall be performed under the following conditions:

- Before first use.
- Before equipment is returned to service following any repairs.
- Before equipment is used after any incident which can be reasonably suspected to have caused damage (when a cord set is run over, for example).
- At intervals not to exceed 3 months. (Note: Cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals of 6 months.)

No employee shall be permitted to use any equipment which has not met the requirements of this program.

A test record shall be kept that identifies all equipment that passes the test. This test record shall indicate the last date the equipment was tested or the interval at which it was tested. The record shall be kept by means of a log, color-coding, or other effective means and shall

be maintained until replaced by a more current record. Any business group may, at its discretion, determine what method to use to document equipment that passes the test. Any employee found falsifying a test record will be terminated immediately.

The Assured Equipment Grounding Program Log, provided in Attachment 3, is an example of a log that may be used to document each piece of equipment that passes the program tests. Any business group may, at its discretion, determine the frequency of completing this log.

The Color Coding Scheme For Assured Equipment Grounding Conductor Test Record, provided in Attachment 4, shall be followed if a color-coding scheme will be used as the method to document test records. A piece of colored tape will be placed on each end of each plug, receptacle, or tool tested. Four separate and distinct colors will be used. Changing the color every 3 months will eliminate the possibility of mistaking the color code and will make it easy to spot un-inspected or out-of-date items. A fifth color will be used when a piece of equipment has been tagged for repair. Any business group may, at its discretion, conduct inspections and change colors monthly rather than quarterly. However, such a system will require using tapes of two colors at one time: the quarterly color, plus another different color to indicate the project's own monthly code. In other words, the system may be augmented by a more stringent system at the project level, provided that the primary quarterly color scheme remains consistent.

5.7 General Installation Requirements

Electrical equipment shall be free of recognized hazards that are likely to cause death or serious physical harm to personnel. The safety of electrical equipment shall be determined by the following considerations:

- Suitability for identified purpose through approval listings, labeling, or certifications
- Mechanical strength and durability
- Electrical insulation
- Heating effects under conditions of use
- Arcing effects
- Classification by type, size, voltage, current capacity, and specific use
- Any other factors that contribute to the practical safeguarding of employees using, or likely to come in contact with, the equipment

Electrical equipment shall be installed in accordance with the following:

- Equipment shall be approved for its intended use and shall be installed in accordance with instructions included in the approval listings, labeling, or certifications.
- The manufacturer's name, trademark, or other descriptive marking shall be placed on the equipment unless other markings are provided giving voltage, current, wattage, or other ratings as necessary.
- Energized parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by approved cabinets or enclosures, an elevation over 8 feet (2.5 meters), or be located in a room, vault, or similar enclosure accessible only to

qualified persons. Entrances to areas with exposed live parts over 600 volts shall be locked or made inaccessible to prohibit access by non-qualified workers.

- Sufficient access and working clearances shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.
- Disconnecting means shall be provided to disconnect all conductors in a structure from the service-entrance conductors. Disconnecting means shall be installed at a readily accessible location and shall be legibly marked to indicate purpose unless purpose is evident by location and arrangement.
- Over-current protection devices shall have an interrupting rating at system voltage sufficient for the current that must be interrupted and shall be readily accessible and legibly marked to indicate purpose unless purpose is evident by location and arrangement.
- Electric equipment shall be firmly secured to the surface on which it is mounted.
- Electrical equipment that depends upon the natural circulation of air for cooling shall be installed so that airflow over such surfaces is not prevented.
- All electrical equipment, tools, switches, and outlets shall be protected from damage by environmental conditions (for example: rain, snow, etc.).
- All wiring components and equipment in hazardous locations shall be maintained in a dust-tight, dust-ignition-proof, or explosion-proof condition, as appropriate. There shall be no loose or missing screws, gaskets, threaded connections, seals, or other impairments to a tight condition.
- Parts of electric equipment that produce arcs, sparks, flames, or molten metal shall be enclosed or separated from all combustible material.
- Conductors shall be spliced or joined with devices designed for that use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be mechanically joined and then soldered. All splices and joints and their free ends shall be covered with insulation.

5.7.1 Grounding

Equipment grounding is a direct connection from the equipment to the earth or a known ground. Electrical parts of tools and equipment are typically housed in metal enclosures to prevent accidental contact and to protect the equipment from dirt and moisture. If an energized wire or conductor comes in contact with the enclosure, a ground-fault will occur, which energize the enclosure. When properly connected, the equipment ground will provide a low-resistance path for the ground-fault to travel to the ground, thereby reducing a potential shock hazard. The grounding wire must provide a low-resistance path and have sufficient current-carrying capacity. Generally, the following equipment requires grounding:

- All three-wire direct current (DC) systems.
- Two-wire DC systems operating over 50 volts.

- All alternating current (AC) circuits operating over 50 volts.
- AC circuits less than 50 volts if overhead conductors are outside of buildings.
- Metal parts of fixed equipment that may become energized if the equipment meets any of the following criteria: (1) within 8 feet (2.5 m) vertically or 5 feet (1.5 m) horizontally of ground or grounded metal objects and subject to employee contact, (2) located in a wet or damp location and subject to employee contact, (3) in electrical contact with metal, (4) in a hazardous location, or (5) supplied by a metal-clad, metal-sheathed, or grounded metal raceway wiring method.
- Metal parts of cord- and plug-connected equipment that may become energized if the equipment meets any of the following criteria: (1) used in a classified hazardous location, (2) operating at over 150 volts, (3) used in damp or wet locations or by employees standing on the ground or on metal floors or working inside of metal tanks or boilers, or (4) used with portable hand lamps.

The following equipment does not require grounding:

- Listed or labeled portable tools and appliances protected by a system of double insulation or its equivalent. If such a system is employed, the equipment shall be distinctively marked to indicate that the tool or appliance uses a system of double insulation (a box in a box on the case is common indication of double insulation).
- Equipment mounted to portable generators and equipment plugged into portable generator receptacles if the equipment's non-current-carrying metal parts and the equipment receptacle's grounding terminals are bonded to the generator frame.
- Equipment mounted to vehicle-mounted generators and equipment plugged into vehicle-mounted generator receptacles, if the equipment's non-current-carrying metal parts and the equipment receptacle's grounding terminals are bonded to the generator frame and the generator frame is bonded to the vehicle frame.

6.0 Training Requirements

CH2M HILL employees using electrical tools and equipment are required to complete either the CH2M HILL 10-Hour Construction Safety Awareness training course or the General Electrical Safety computer-based training module found on the HS&E Web page.

CH2M HILL competent persons designated as inspectors to test equipment, as part of a project's assured equipment grounding conductor program, shall be SSC trained and qualified.

Each employee using electrical power tools and extension cords must perform a visual inspection before each day's use of the cord set, attachment cap, plug, and receptacle of cord or tool sets, and any tool or equipment connected by cord and plug, except cord and receptacles which are fixed in place and not exposed to damage.

The requirement for daily visual inspection of electrical power tools and extension cords shall be a tool box safety meeting topic at least monthly.

Additional project training requirements may be necessary in the project's written safety plan. Electrical subcontractors are responsible for complying with all applicable HS&E

training requirements and for providing the training necessary to complete their tasks safely.


7.0 Assessment Requirements

The “HS&E Self-Assessment Checklist – Electrical Safety” in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SSC and provides this information in the project’s written safety plan. The RHSM shall assist the SSC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor’s activities.

8.0 Attachments

- Attachment 1: [Subcontractor Safety Procedure Criteria – Electrical Safety](#)
- Attachment 2: [HS&E Self-Assessment Checklist – Electrical Safety](#)
- Attachment 3: [Assured Equipment Grounding Program Log](#)
- Attachment 4: [Color Coding Scheme for Assured Grounding Conductor Test Record](#)

9.0 Revision Log

Revision	Date	Description	Prepared by	Approved by
1	9/18/2007	Updated to Standard Operating Procedure	Angelo Liberatore	



Attachment 1: Subcontractor Safety Procedure Criteria – Electrical Safety

The following criteria are not intended to be all-inclusive. The criteria are provided as a tool to facilitate development and review of subcontractor electrical safety procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Electrical Safety Procedures

1. Provide the names and qualifications (years and type of experience, training background, etc.) of employees who will conduct installation, adjustment, repair, or replacement of electrical components or equipment.
2. Provide a copy of the written Assured Equipment Grounding Program and the policy for use of ground fault circuit interrupters (GFCI).
3. Describe electrical equipment and activity inspection criteria or procedures (frequency of inspections and items that are inspected).



Attachment 2: HS&E Self-Assessment Checklist – Electrical Safety

HS&E Self-Assessment Checklist – Electrical Safety

Page 1 of 2

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations when: (1) CH2M HILL employees are required to use electrical appliances, are exposed to electrical hazards, or are working on or near exposed energized electrical equipment; and/or (2) CH2M HILL provides oversight of an electrical subcontractor.

The Safety Coordinator (SC) may consult with electrical subcontractors when completing this checklist, but shall not direct the means and methods of electrical operations nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and CH2M HILL must carefully rely on their expertise. Items or conditions considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____		Project No.: _____	
Location: _____		Project Manager: _____	
Auditor: _____		Date: _____	
This specific checklist has been completed to:			
<input type="checkbox"/> Evaluate CH2M HILL employee exposure to electrical hazards (Complete Section 1)			
<input type="checkbox"/> Evaluate a CH2M HILL subcontractor's compliance with electrical safety requirements (Complete entire checklist)			
Subcontractor's Name: _____			
<ul style="list-style-type: none"> • Check "Yes" if an assessment item is complete/correct. • Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No." • Check "N/A" if an item is not applicable. • Check "N/O" if an item is applicable but was not observed during the assessment. 			
Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-206.			

SECTION 1 – SAFE WORK PRACTICES**General Requirements (5.1)**

	Yes	No	N/A	N/O
1. Personnel have completed electrical safety training.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Attempts are made to locate all energized electrical circuits before work begins.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Installation/repair areas sufficiently guarded with barriers and signs to prevent unauthorized entry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Only qualified employees installing or working with electrical equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Electrical circuits that may be contacted are de-energizing and grounded or guarded.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Lockout/Tagout procedures when required verified using the checklist provided in HSE-307.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Only qualified electrical workers defeating electrical safety interlocks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Where the location of underground power lines is unknown, insulated gloves are used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Electrical Power Tools and Extension Cords (5.3)

	Yes	No	N/A	N/O
9. Electric power tools and extension cords inspected prior to use. Damaged equipment not used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Extension cords supplying power tools provided with Ground Fault Circuit Interrupters (GFCI).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Electric power tools operated and maintained according to manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Electric power tools effectively grounded or double-insulated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Extension cords grounded and designed for heavy duty or industrial grade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Extension cords not substituted for fixed wiring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Extension cords covered, elevated, or protected when passing through work areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Extension cords passing through doorways or other pinch points protected from damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Extension cords not concealed or run through walls, ceilings, or floors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Extension cords not fastened with staples, hung from nails, or suspended with wire.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Working space, walkways, and similar areas are kept clear of cords to prevent tripping hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<u>SECTION 1 – SAFE WORK PRACTICES (Continued)</u>				
	Yes	No	N/A	N/O
Portable Lighting (5.4)				
20. Portable lamps wired with flexible cord with grounded plugs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Portable lights not suspended by their electric cords unless designed for suspension.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Portable lights protected from contact or breakage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Portable lights used in wet locations operated at 12 volts or less or used with GFCI.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overhead Power Lines (5.5)				
24. Lines de-energized and grounded, insulated, or safe clearance distance maintained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Personnel stay clear of grounding point of equipment intentionally grounded.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Personnel do not touch or approach equipment that has become energized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>SECTION 2 – ELECTRICAL SAFETY REQUIREMENTS</u>				
General Installation Requirements (5.7)				
35. Competent person overseeing electrical activities, including inspections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Subcontractor personnel using appropriate safety and protective equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Electrical equipment free from recognized hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Equipment approved for intended use and installed according to approvals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Manufacturer's name, trademark, or other descriptive marking placed on equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Energized parts > 50 volts guarded against accidental contact.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Electrical equipment > 600 volts placed in a vault, room, closet, or protected area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Sufficient access and working clearances provided and maintained for all electric equipment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Means provided to disconnect conductors from the service-entrance conductors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Circuit breakers sufficient for system current load.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Over-current protection devices readily accessible and legibly marked to indicate purpose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Equipment firmly secured to surface on which it is mounted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Electrical equipment ventilated for cooling as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Electrical equipment protected from damage by environmental conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Equipment in hazardous locations maintained in a dust-tight, ignition-proof condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Equipment producing arcs, sparks, flames, enclosed or separated from combustible material.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Conductors spliced or joined properly and free ends covered with insulation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Equipment grounding provided on all equipment requiring such grounding.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ground-fault Protection (5.6)				
53. GFCIs used or an assured equipment-grounding conductor (AEGC) program implemented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. When GFCIs used, installed on all 120-volt, 15- and 20-ampere temporary receptacle outlets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. When AEGC program used, covers all extension cords and temporary receptacles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. AEGC program also covers all equipment connected by cord and plug.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Under AEGC program, equipment visually inspected for external defects before each day's use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Under AEGC program, continuity and grounding testing performed at least every 3 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Records maintained for all AEGC program testing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Complete this section for all items checked “No” in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Auditor: _____ Project Manager: _____



Attachment 3: Assured Equipment Ground Program Log

Month: _____ Year: _____ Color Code: _____ Project Number: _____ Location: _____ Page _____ of _____

[illegible]



Attachment 4: Color Coding Scheme for Assured Equipment Grounding Conductor Test Record

COLOR CODING SCHEME FOR ASSURED EQUIPMENT GROUNDING CONDUCTOR TEST RECORD

Month or Quarter	Color Coding Scheme	
	Monthly	Quarterly
January	White/White	White
February	White/Yellow	
March	White/Blue	
April	Green/Green	Green
May	Green/Yellow	
June	Green/Blue	
July	Red/Red	Red
August	Red/Yellow	
September	Red/Blue	
October	Orange/Orange	Orange
November	Orange/Yellow	
December	Orange/Blue	
Repair or Incident	Brown	Brown



Exposure Assessment for Airborne Chemical Hazards Enterprise Standard Operating Procedure HSE-207

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups must comply, when performing exposure assessments for airborne chemical hazards.

2.0 Scope and Application

2.1 Scope

This SOP outlines the process for evaluating potential airborne chemical contaminant exposures to CH2M HILL employees performing field project activities. The SOP applies to CH2M HILL employees or other parties adjacent to CH2M HILL's work who are potentially exposed to airborne chemical hazards. This process may be used to assess the potential exposures for the following scenarios, but is not limited to only these:

- Hazardous waste operations or facilities where hazardous waste is treated or stored
- Confined-space entry
- Industrial or municipal facilities or project field sites where potential over-exposure to regulated air contaminants may occur
- Situations where compliance with legal standards must be demonstrated

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, , their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some State Occupational Safety and Health (OSHA) plans may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (HSM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health and safety (H&S) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific H&S regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are potentially exposed to the airborne chemical hazards on projects and/or,

- CH2M HILL provides oversight of subcontractor's exposure assessments for airborne chemical hazards.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to performing exposure assessments for airborne chemical hazards:

3.0 Definitions

3.1 Action Level

An action level is the agreed upon exposure level, based upon site-specific conditions, that requires onsite staff to take a specific action (for example, upgrade the level of respiratory protection, or ventilate the area).

3.2 Air Monitoring

Air monitoring refers to the use of a direct-reading instrument (DRI) to obtain real-time concentrations of contaminants of concern; it's sometimes referred to as air testing.

3.3 Air Sampling

Air sampling refers to the use of an air sampling pump and collection media (or other appropriate means) to obtain samples of contaminants of concern. Samples must later be run through a separate analysis process in order to determine contaminant concentrations.

3.4 Ceiling Limit (C)

A ceiling limit is an exposure limit that must not be exceeded even instantaneously; ceiling limits protect against acute effects.

3.5 Exclusion Zone (EZ)

An exclusion zone is the area known (or suspected) to be contaminated.

3.6 Immediately Dangerous to Life and Health Limit (IDLH)

The immediately dangerous to life and health limit is a NIOSH-established exposure hazard limit referring to the concentration of an air contaminant that will cause irreversible health effects or escape-impairing symptoms within 30 minutes.

3.7 Permissible Exposure Limit (PEL)

A permissible exposure limit is an 8-hour time-weighted average exposure limit set by OSHA to protect employees from harmful effects of chemical and physical hazards.

3.8 Recommended Exposure Limit (REL)

A recommended exposure limit is similar to a PEL but set by NIOSH and not legally enforceable.

3.9 Short-Term Exposure Limit (STEL)

A short-term exposure limit refers to a 15-minute exposure. STELs protect against acute exposures. Excursions above the time-weighted average (TWA) to the STEL are permitted four times per day for 15 minutes each, provided that the TWA is not exceeded.

3.10 Threshold Limit Value (TLV)

The threshold limit value is the same type of exposure limit as a PEL, but these are set by the ACGIH and are not legally enforceable. The PEL, REL, or TLV may be designated with a “skin” or “S” notation. This designation indicates that the chemical also has an exposure route through the skin, mucous membranes, or eyes that can significantly contribute to the inhalation exposure route. Increased dermal protection should be worn when dealing with these types of chemicals.

3.11 Time-Weighted Average (TWA)

A time-weighted average is a generic term that refers to any 8-hour exposure limit (such as, PEL, REL, or TLV).

4.0 Roles and Responsibilities

The following sections outline the roles and responsibilities for individuals when using this procedure.

4.1 Business Group Health and Safety Leads

The BG H&S Leads are responsible for implementing this Enterprise H&S SOP for all projects in their BG. The BG H&S Lead also has the authority to approve deviation from this standard to accommodate local requirements.

4.2 Project Manager

The CH2M HILL Project Manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the H&S management process. The PM has overall H&S management responsibility, but may delegate specific tasks to other project staff. The PM retains ultimate H&S responsibility for the project.

4.3 Site Manager

The CH2M HILL Site Manager (SM) is responsible for all field operations onsite and is typically the Construction Manager (CM), Site Superintendent, Site Supervisor or Field Team Leader. The SM is directly responsible for implementing all aspects of the project H&S plan, as assigned by the PM.

4.4 Responsible Business Group HSM (RHSM)

The RHSM is the HSM assigned by the BG H&S Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the CH2M HILL project H&S plan, reviews subcontractor H&S plans and submittals, conducts project H&S audits and provides H&S support and guidance to the project.

The RHSM is responsible for the following actions, as it relates to performing exposure assessment for airborne chemical hazards:

- Determining the potential chemical exposures based on activity and chemical information
- Determining the relevant OEL to be used as the basis for controlling employee exposure and setting action limits
- Determining appropriate control measures to reduce chemical exposures, if necessary
- Developing an air monitoring or sampling strategy for the project
- Selecting the appropriate air monitoring and sampling equipment for the project
- Establishing the appropriate action levels for a project and including the necessary information in the site-specific written safety plan
- Providing technical assistance to the site safety coordinator (SSC)

4.5 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the SM, or is designated by the SM to implement the project H&S Plan and who has successfully completed all required SC training.

The SC is responsible for the following actions, as it relates to performing exposure assessment for airborne chemical hazards:

- Conducting air monitoring or air sampling when specified, which includes instrument calibration, maintaining calibration records, recording monitoring results, maintaining chain-of-custody forms, and properly packing and shipping samples
- Informing the RHSM when site conditions or chemical use changes
- Reviewing subcontractor air monitoring and air sampling activities per the plan and contract
- Providing written notification on air sampling results to CH2M HILL employees monitored

4.6 CH2M HILL Employees

Employees are responsible for notifying the designated safety coordinator (DSC) or site safety coordinator (SSC) or the health and safety manager (HSM) if they believe they have been or will be exposed to chemical hazards that have not previously been identified in the site-specific written safety plan.

5.0 Requirements

The following requirements for performing exposure assessments for airborne chemical hazards, outlined in this Enterprise SOP must be implemented.

5.1 CH2M HILL Policy

It is CH2M HILL's policy to anticipate, recognize, evaluate, and control employee exposures to hazardous chemicals. When feasible, CH2M HILL will use the most relevant OEL, as determined by the RHSM, as the basis for controlling employee exposures and setting action limits as a means of evaluating the potential exposures to airborne chemical hazards.

5.2 Subcontractor Management

Subcontractor H&S responsibilities are expressly defined through the subcontract terms and conditions. Subcontractors must determine how to conduct their operations, in compliance with applicable H&S regulations and industry standards, and how to correct deficiencies. CH2M HILL employees shall not direct the means and methods of subcontractor operations.

Subcontractors are responsible and accountable for implementing these requirements and any additional requirements established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of H&S requirements.

5.3 Air Monitoring and Air Sampling Applications

By comparing air monitoring and air sampling results to the established hazard exposure limits, you can do the following:

- Document that an overexposure has not occurred
- Demonstrate compliance with legal standards
- Determine if engineering controls (such as ventilation) or personal protective equipment (PPE) are needed to control exposure

5.3.1 When to Use Air Monitoring

Use air monitoring when real-time results are adequate or specifically needed; but only use it when potential contaminants are well characterized or objective data indicates what chemicals are present. SOP 10 discusses direct air monitoring for external radiation.

5.3.2 When to Use Air Sampling

Use air sampling when you need a direct comparison to a TWA or STEL, or to demonstrate that no airborne exposure exists at or around a contaminated site. Under specific situations, some safety regulations require air sampling for exposure to certain contaminants (asbestos, lead, and cadmium for example). Air sampling is also used when a potential for airborne radioactive particles exists (see SOP 10).

5.4 Air Monitoring Protocols

5.4.1 Instrument Selection

Descriptions of the following types of air monitoring instruments, which are commonly used by CH2M HILL, can be found in Attachment 3.

- Photoionization detector (PID)
- Flame ionization detector (FID)
- Combustible gas indicator (CGI) and oxygen level indicator
- Combination meters (PID, CGI, oxygen, toxic gas)
- Colorimetric detector tube
- Passive aerosol (dust) monitor

The RHSMs select the specific type of air monitoring equipment on a case-by-case basis. They use the following factors to determine the appropriate type of air-monitoring instrumentation.

Physical State of the Chemical

In order for the RHSMs to select the appropriate air monitoring instrument, they must consider the following physical and chemical factors:

- Volatile compounds should be monitored with a PID, FID, combination meter, or colorimetric tube (the specific instrument depends on the factors discussed below). Use the tools in Attachment 4 and 5, for both groundwater and soil respectively, to make predictions about the amount of volatilization.
- Nonvolatile compounds can become airborne as particulates. A passive aerosol monitor can be used to monitor for dust as a proxy for the chemical compound. Total dust action levels are established based on a particulate's concentration. Additional information establishing total dust action levels is specified in Attachment 6.
- Semivolatile compounds can be monitored as either a vapor or a particulate, depending on the contaminant level and ambient conditions (for example, task conditions or temperature). Additional information on establishing total dust action levels based on semivolatiles as particulates is specified in Attachment 6.

Chemical Properties

For volatile and semivolatile compounds, knowing the photo ionization potential (PIP) is critical in determining the appropriate instrument. If the compound has a PIP less than 11.7eV, it is possible to use a PID if other criteria are met (for example, humidity does not fog the instrument's lamp). If the ionization potential is greater than 11.7eV, an FID is required.

Instrument Detection and Exposure Limits

When selecting an instrument, also consider whether the detection limit is above the exposure limit. If the instrument cannot detect the chemical until it is at or above a potentially harmful level, do not use the instrument for that application.

5.4.2 Establishing an Action Level

Once the appropriate instrument has been selected, establish the levels at which specific actions must be taken. The HSM will establish action levels on a project-by-project basis, based on the potential compounds present onsite.

Action levels are established based on approximately one-half the value of the lowest TWA. The action level is considered to have been met when the level has been sustained (for example, for 5 minutes) in the breathing zone. If the potential contaminants are unknown,

follow the EPA action levels listed in Attachment 2. You should also follow the EPA action levels in Attachment 2 for flammable compounds and elevated oxygen levels (unless working in a confined space). See SOP HS-17 for additional information on action levels when working in confined spaces.

For radiological hazards, use the EPA action levels listed in Attachment 2.

5.4.3 Instrument Calibration

Calibrate air monitoring equipment prior to using it. The site-specific written safety plan contains specific information on the frequency of calibration and the calibration parameters. Instruments must be calibrated on a daily basis and must meet the parameters found in Attachment 7. Attachment 8 contains the information that needs to be recorded in the project files each time the instrument is calibrated.

5.4.4 Air Monitoring Procedures

Instrument Operations

The basic operating instructions for each instrument CH2M HILL commonly uses is found in Attachment 7.

Air Monitoring Location

Typically air monitoring is conducted at one or more of the following areas for the reasons given below.

- At the source. Monitoring at this location gives a worst-case assessment of the situation. Explosive gases should be monitored at the source whenever possible. Monitoring toxic compounds at the source can give an indication whether a potential exposure problem exists. If concentrations at the source are below the actions level, a potential exposure problem is unlikely.
- In the employees' breathing zone. Monitoring should be conducted in the employees' breathing zones to determine concentrations of chemicals that they may potentially be exposed to. Since employees doing different tasks may have different potential exposures, monitoring should be conducted for the worst case task or for each task.
- At the perimeter. Perimeter monitoring is used to document that the surrounding community is not being adversely affected by the operations. This type of monitoring is typically conducted only if elevated levels are seen in the workers' breathing zones or at the perimeter of the exclusion zone, if it is required by the client, or if it is warranted as a means of documenting that no offsite releases occur.

Whenever possible, monitoring should be conducted prior to entering the potentially hazardous area.

Air Monitoring Hierarchy

Because some instruments do not operate properly without plenty of oxygen, and others can cause explosions, air monitoring should be completed in the following order:

- Oxygen
- Explosive gases
- Toxicity compounds

Air Monitoring Frequency

The frequency of monitoring is determined on a project-by-project basis and is included in the site-specific written safety plan.

5.4.5 Notification of Results

Communicate air monitoring results to CH2M HILL staff on a regular basis, but at a minimum whenever an action level is exceeded. Information should be communicated to subcontractors and other onsite parties as outlined in SOP [HSE-215](#).

5.4.6 Recordkeeping

In addition to the calibration information found in Attachment 8, the following information regarding air monitoring and sampling results must be recorded in the project records:

- Instrument reading
- Weather conditions
- Sample location (breathing zone, headspace)
- Operator's name and signature
- Date and time

5.5 Air Sampling Protocols

5.5.1 Pump Operation

Attachment 9 contains basic information on the operating principles of air sampling pumps.

5.5.2 Sample Method Selection

OSHA, NIOSH, and the American Society for Testing and Materials (ASTM) publish approved sampling methods for a variety of organic and inorganic compounds. These methods should be followed whenever possible. EPA or laboratory recommended procedures should be followed whenever these methods are not available for a particular compound.

5.5.3 Calibration

Calibrate sampling pumps following the sampling methodology's recommendation. Maintain all calibration information on the Sample Pump Calibration Form (see Appendix 10).

5.5.4 Sample Collection

Samples will be collected following sampling methods approved by OSHA or NIOSH whenever possible. If an approved method is not available, consult the analysis laboratory to determine the appropriate sample collection procedures. Sample collection data and sampling conditions must be noted on the Sample Collection Form (or equivalent) (see Appendix 11).

5.5.5 Sample Shipping

Do not ship samples or change custody without completing the chain-of-custody form. The lab completing the analysis should provide the appropriate form. If not, use the Chain-of-Custody Form found in Appendix 12.

If samples are considered dangerous goods, the employee packing, labeling, marking, completing the airbill, or driving the samples must have completed dangerous goods training.

5.5.6 Sample Analysis

Only use a laboratory accredited by the American Industrial Hygiene Association (AIHA) to analyze samples.

5.5.7 Notification of Results

Employees potentially exposed to the substances for which air sampling is being performed shall be given the opportunity to observe the exposure measurements, and records shall be made available to all affected employees upon request or when they are required to be provided by a specific regulation. Employees may also receive a copy of their exposure records from the Medical Surveillance Program Administrator (MSPA).

5.5.8 Recordkeeping

The information that must be recorded in association with air sampling is recorded on the Air Sampling Calibration Form and Sample Collection Form (see Attachment 10 and 11).

Exposure records must be preserved for the duration of employment plus thirty years. Send copies of all project exposure records to the MSPA for retention until the employee terminates. Upon termination, the MSPA shall forward all records to the corporate human resources department for archiving with other employee records.

6.0 Training Requirements

The SSC is responsible conducting air monitoring or air sampling when specified in the HSP and shall be knowledgeable in the calibration, use and maintenance of the instruments. The SSC shall read, understand and have available on site, the air monitoring and air sampling instrument manuals that will be used onsite.

When performing air monitoring or air sampling procedures on hazardous waste operations projects the SSC shall complete the Safety Coordinator-Hazardous Waste operations Training (SC-HW).

For confined space entry projects that require air monitoring procedures to be implemented, the SSC shall complete the CH2M HILL-required, classroom-based Confined Space Entry Training Program, which includes air monitoring instrument training.

For all other projects (industrial or municipal facilities), requiring air monitoring or sampling procedures to be performed, the RHSM shall confirm that the SSC is knowledgeable in the calibration, use and maintenance of the instruments to be used on the project and provide additional instruction to the SSC, as appropriate.

Subcontractors are responsible for complying with all applicable HS&E training requirements and for providing the training necessary to complete their tasks safely.

7.0 Attachments

Attachment 1: [Hazard Exposure Limits](#)

Attachment 2: [EPA Recommended Action Levels](#)

Attachment 3: [Tables of Air Monitoring Instruments](#)

Attachment 4: [Vapor Macro](#)

Attachment 5: [Soil Macro](#)

Attachment 6: [Dust Macro](#)

Attachment 7: [Equipment Training Book](#)

Attachment 8: [Summary of Calibration Procedures](#)


Attachment 9: [Air Sampling Pump Description](#)

Attachment 10: [Air Sampling Pump Calibration Form](#)

Attachment 11: [Air Sampling Pump Collection Form](#)

Attachment 12: [Chain-of-Custody Form](#)

8.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	9/27/2006	Updated to Standard Operating Procedure	Angelo Liberatore; Mark Fagan	



Attachment 1: Hazard Exposure Limits

Exposure Limits				
Hazard	Exposure Limit		Explanation	Source
Inhalation of airborne chemical contaminants	PEL	Permissible Exposure Limit	Time-weighted average, short-term, and ceiling limit (see below) derived from the 1968 threshold limit values. PEL is the legal limit.	OSHA
	TLV	Threshold Limit Value	Time-weighted average, short term, and ceiling limit (see below) developed as any industry guideline. Not enforceable, but considered to be best practice.	ACGIH
	REL	Recommended Exposure Limit	Time-weighted average, short term, and ceiling limit (see below) developed by NIOSH as a recommendation to OSHA in the standard-setting process. Not enforceable, but must be considered when a PEL or TLV has not been established.	NIOSH
	TWA	Time-weighted average	The time-weighted average concentration for an 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect.	Applied to the PEL, the TLV, and the REL.
	STEL	Short-term exposure limit	A 15-minute time-weighted average exposure that must not be exceeded at any time during the workday. Four excursions to the STEL are permitted.	
	C	Ceiling	The concentration that must not be exceeded even instantaneously.	
	IDLH	Immediately Dangerous to Life or Health	The maximum level from which a worker could escape without any escape-impairing symptoms or any irreversible health effects.	NIOSH
Dermal absorption of chemical contaminants through airborne or direct contact	Skin (S) designation		The skin (S) designation in the OSHA, ACGIH, and NIOSH limits indicates that a substance may be readily absorbed through the intact skin; however, it is not a threshold for safe exposure. Direct contact with a substance designated "skin" should be avoided, or adequate PPE should be specified.	OSHA ACGIH NIOSH
Oxygen-deficient, explosive, radioactive, toxic atmospheres	EPA Action Levels		Refer to Table 2. System for selecting PPE and other appropriate actions (responses) that is based on total vapor or gas concentrations measured with a direct reading instrument (DRI).	EPAS
Ionizing radiation and radionuclides	Maximum permissible body burden and maximum permissible concentrations of radionuclides in air and in water.			NCRP
	PEL	Permissible Exposure Limit	Maximum radiation dose per calendar quarter. Measured in Roentgen-equivalent man (REM) units.	OSHA



Attachment 2: EPA Recommended Action Levels

EPA Recommended Action Levels		
Hazard	Action Level	Action Required
Oxygen-deficiency	<ul style="list-style-type: none"> Less than 19.5% oxygen 21.0% oxygen Greater than 25% oxygen 	<ul style="list-style-type: none"> Use air supplying respirator. Normal atmospheric oxygen level. Fire hazard. Work should cease.
Explosive Atmosphere	<ul style="list-style-type: none"> Less than 10% of lower explosive limit (LEL) 10-20% of LEL Greater than 25% of LEL 	<ul style="list-style-type: none"> Work may proceed. Work may continue with extreme caution and continuous monitoring. Explosion hazard. Work should cease. Vent or evacuate.
Toxic Atmospheres ¹ (organic vapors only)	<ul style="list-style-type: none"> Organic vapors at background Organic vapors - background to 5 ppm above background Organic vapors - 5 to 500 ppm above background Organic vapors - 500 ppm above background and higher 	<ul style="list-style-type: none"> Use Level D protection. Use Level C protection. Use Level B protection. Use Level A protection.
¹ The measurements are made with a FID calibrated to methane or an PID with an 11.7 uv source calibrated to isobutylene.		



Attachment 3: Tables of Air Monitoring Instruments

Combustible Gas Indicator (CGI)		Oxygen Level Indicator	
Appl			
Hazard:	Flammable and explosive vapors and gases.	Hazard:	Oxygen-deficient atmospheres..
Application:	Determines % LEL.	Application:	Determines %O ₂ . Also assesses the presence of asphyxiants, or large amounts of gases/vapors.
Components:	Pump to draw sample; meter readout with needle or LCD; audio or visual alarm; zero adjustment.	Components:	Usually combined with CGI. Pump to draw sample, but can be passive; meter readout with needle or LCD; audio and/or visual alarm; calibration adjustment
Method:	Combustion on heated platinum filament.	Method:	Electrochemical cell.
Operation:	A sample is drawn over the filament. The flammable components combust on the filament which increases the temperature. The increase is detected by a potentiometer.	Operation:	A sample is drawn or allowed to diffuse into the cell. Oxygen in the sample reacts with electrolyte in the cell generating a current. A potentiometer detects the increased current.
Readout:	0 - 100% LEL. When concentrations are above the actual LEL, the meter remains at 100 percent. With many CGIs, the meter returns to 0 when concentrations are greater than the UEL (upper explosive limit). Instruments with audio or visual alarms can be set at whatever level desired by operator.	Readout:	% O ₂ . Most instruments read from 0 - 25% O ₂ .
Calibration:	In general, calibrated with methane, pentane, or hexane gas standards. Calibration check daily before and after use.	Calibration:	In general, calibrated to ambient (21%) oxygen at the temperature and pressure of use. Calibration check daily before and after use.
Approval:	Desired approval is for Class 1 Division 1 Groups ABCD. Not all CGIs are approved.	Approval:	Desired approval is for Class 1 Division 1 groups ABCD. Not all oxygen meters are approved.
Limitations:	Sensitivity can be reduced by: selenium and silicon compounds; arsenic; volatile heavy metals; high humidity. Halogenated hydrocarbons corrode the detector.	Limitations:	Reading affected by temperature and pressure. Oxidizers causes increased readings. Carbon dioxide reduces sensitivity.
Limits:	Used with EPA action levels for explosive atmospheres (Table 2) and OSHA confined space entry limits (SOP HS-17).	Limits:	Used with EPA action levels for oxygen-deficient atmospheres (Table 2) and OSHA confined space entry limits (SOP HS-17).

Colorimetric Detector Tubes		Radiation Survey Meter	
Hazard:	Inorganic and organic vapors and gases.	Hazard:	Alpha, beta, gamma radiation.
Application:	Determines concentration of specific vapor or gas.	Application:	Determines the presence and level of radiation
Components:	Bellows or piston pump; detector tube.	Components:	Depending on specific instrument, an alpha scintillator Geiger-Mueller probe, gamma scintillator or alpha-beta-gamma probe; meter with needle readout; audio; range selector.
Method:	Chemical reaction with color change.	Method:	Gas or solid ion detection media.
Operation:	The sample is drawn through the detector tube at a constant flow rate. If the sample contains the vapor or gas in question it will react with the chemical on the packing material. The result is a color change. The concentration is directly proportional to the length of stain.	Operation:	The radiation causes ionization of the detection media. The ions generated are counted electronically. The greater the number of counts, the higher the activity of the source.
Readout:	The tubes normally read directly in ppm or percent from a scale on the tube. Some tubes have scales in millimeters. With that type the length is read in mm and referenced to a scale, e.g., 10 mm = 150 ppm.	Readout:	The readout normally is in mR/hr or uR/hr (note: R = Roentgen). For exposure, readings are converted to mREM/hr or uREM/hr (note: REM = Roentgen-equivalent man). For alpha, readings are in counts/minute.
Calibration:	The tubes are self-calibrated. The pump must be checked daily before and after use for leaks.	Calibration:	Factory calibrated annually. Many instruments have a check source which allows the operator to determine if the unit is functioning.
Approval:	None — usually not required.	Approval:	None — usually not required.
Limitations:	The problems which contribute to poor accuracy are: leak in pump; insufficient contact (analysis) time; high humidity; high temperature; difficulty reading scale; interferences from other compounds; improperly stored or out of date tubes.	Limitations:	Gamma radiation typically is more accurately quantified than beta or alpha radiation. Individual probes must be calibrated to the source in order to get accurate readings.
Limits:	Compared to hazard (exposure) limit for specific chemical, e.g., the PEL, REL, or TLV.	Limits:	EPA action levels for ionizing gamma radiation appear in Table 2. Refer to SOP HS-XX for additional limits for gamma, beta, and alpha, including radionuclides.

Photoionization Detector (PID)		Flame Ionization Detector (FID)	
Hazard:	Organic and inorganic vapors and gases.	Hazard:	Organic gases and vapors.
Application:	Determines relative total concentration of selected air contaminants which is used to specify engineering controls and PPE requirements.	Application:	Determines relative total concentration of selected organic air contaminants which is used to specify engineering controls and PPE requirements.
Components:	Pump to draw sample; photoionization detectors; readout, either meter or LCD; datalogger available on some models.	Components:	Pump to draw sample; flame ionization detector; readout, either meter or LCD; datalogger available on some models.
Method:	Photoionization using an ultraviolet lamp.	Method:	Flame ionization using hydrogen flame.
Operation:	Ultraviolet light is directed at the sample. If the lamp energy is sufficient molecules are ionized and detected. The energy must be greater than ionization potential (IP) of the molecule.	Operation:	Sample is burned in hydrogen flame. If the flame energy is sufficient molecules are ionized and detected.
Readout:	PPM.	Readout:	PPM.
Calibration:	Isobutylene gas standard (refer to Table 3). Calibrate daily before and after use.	Calibration:	Methane gas standard (refer to Table 3). Calibrate daily before and after use.
Approval:	The desired approval is Class 1 Division 1 Groups ABCD.	Approval:	The desired approval is Class 1 Division 1 Groups ABCD.
Limitations:	The PID detects any organic and inorganic molecule that can be ionized by the lamp. The common components of air and methane are not detected. PIDs cannot be used for qualitative determinations and are strictly quantitative except when used with support technology (e.g., gas chromatography). High humidity generally reduces sensitivity particularly with higher energy lamps.	Limitations:	The FID detects any organic molecule that can be ionized by the flame. Common components of air are not detected, but methane is. FIDs cannot be used for qualitative determinations and are strictly quantitative except when used with support technology that can separate individual molecules (e.g., gas chromatography).
Limits:	EPA action levels (Table 2) and individual PEL, TLV, or REL hazard (exposure) limits. Note: PIDs must be calibrated to the specific chemical contaminant in order to compare its readout to individual hazard limits.	Limits:	EPA action levels (Table 2) and individual PEL, TLV, or REL hazard (exposure) limits. Note: FIDs must be calibrated to the specific chemical contaminant in order to compare its readout to individual hazard limits.

Passive Aerosol (Dust) Monitor		Air Sampling Pump	
Hazard:	Respirable dusts (aerosols).	Hazard:	Specific organic and inorganic vapors, gases, and aerosols (dusts).
Application:	Determines total concentration of respirable dust which is used to specify engineering controls and PPE requirements.	Application:	Determines concentration of specific chemical contaminants which is used to specify engineering controls and PPE requirements and demonstrate compliance with hazard (exposure) limits.
Components:	Photodetector; LCD readout; microprocessor that can calculate 8-hour TWA.	Components:	Constant-flow adjustable air sampling pump with appropriate collection media (sorbent tube or impinger).
Method:	Light-scattering detected by photodetector.	Method:	Collection and concentration of contaminant on collection media.
Operation:	The instrument continuously senses the intensity of light from the combined scattering of particles present in the sensing chamber. As the number of particles increases, intensity increases. The photodetector generates a voltage proportional to intensity. The readout displays proportional to intensity. The readout displays the dust level every 10 seconds.	Operation:	The air sampling pump causes air to be drawn through the collection media at a constant, predetermined flow rate. After a specified sampling time (typically 8 hours), the collection media is sent to a laboratory for analysis. The contaminant level is usually calculated as a time-weighted average (TWA).
Readout:	mg/M ³ .	Readout:	The TWA is usually reported as PPM or mg/m ³ .
Calibration:	Zero reference set in dust-free environment. Set daily before and after use.	Calibration:	The air sampling pump must be calibrated to a primary air flow standard.
Approval:	The desired approval is Class 1 Division 1 Groups ABCD.	Approval:	The air sampling duration is typically 8 hours, with laboratory analysis ranging from days to weeks; results are not available in real-time. Air sampling is expensive, with costs ranging from \$50 to \$500 per sample.
Limitations:	The photodetector detects total respirable dust present in the sensing chamber. Fibrous particles (e.g., asbestos) are not detected. Dust monitors cannot be used for qualitative determinations and are strictly quantitative. Dust build-up in the sensing chamber causes the zero point to drift. Direct sunlight that enters the sensing chamber can cause erroneous readings.	Limitations:	Results compared to hazard (exposure) limit for specific chemical, e.g., the PEL, REL, or TLV.
Limits:	The respirable dust PEL is 5 mg/M ³ . The dust macro can be used to establish exposure (hazard) limits for contaminated dusts.	Limits:	

Attachment 4: Vapor Macro

How to Use Vapor Macro

Vapor macro is an EXCEL spreadsheet that relates a contaminant's water concentration to its saturation air concentration. Common compounds have chemical parameters pre-entered. To use:

- Enter the spreadsheet (VAPOR.XLS).
- Check that the screen above the explanation contains the contaminants of concern. Import rows of information from the storage space below or add data as needed .¹
- Preset concentration (Column B) to "1E-09" using the copy function. Enter the highest concentration(s) of contaminants of concern. The macro calculates continuously; the results appear as soon as data is entered.

The results are interpreted as follows:

Saturation concentration is the worst case concentration of individual chemicals, with the sum appearing below.

If the **saturation concentration % exposure limit** is less than 100%, the compound is a problem only as part of mixture toxicity. IF 100% - 500%, the compound is a problem in confined spaces. If 500% - 5,000%, the compound may be a problem during "normal" field operations (plenty of ventilation). If greater than 5,000%, exposure under "normal" field conditions may be significant, and should be evaluated. If the percent combined exposure limit (the sum) is below 100%, exposure above the limit is not possible, even in a confined space. The single compound exposure ranges discussed above also apply to the sum.

Example #1

The use of the vapor macro is best explained through example applications.

The maximum concentrations of benzene, toluene, and xylene in groundwater are 2, 360, and 45 ug/l (ppb) respectively. Monitoring wells are to be developed and sampled. Do these materials present an air hazard? What are the respiratory protection and monitoring requirements?

Refer to example spreadsheet #1. The vapor macro model predicts that xylene (88%) will be the majority of saturated vapor present, followed by xylene (11%) and benzene (1%). Under saturated conditions, xylene will be present at 47% of its exposure limit; benzene at 33%; and xylene at 3%. The mixture of total volatiles represents 83% of the exposure limit. What this means is that even under worst-case (confined) conditions, exposure to the vapors of individual chemicals or their combination will be below the exposure limit. Under normal field conditions (plenty of ventilation), exposures even further below the limit are anticipated. Respiratory protection is not required; the work could proceed in Level D.

¹ Impossibly high solubilities (e.g., acetone = 3×10^6 mg/l) are used for highly soluble materials to force the equation to yield useful results.

Representative air monitoring with a DRI should be periodically performed in several locations to confirm that the prediction is accurate. Since benzene is regulated by a specific OSHA standard, confirmatory sampling should also be periodically performed. If anything unusual occurs (odors, symptoms of exposure, and so forth), the situation should be re-evaluated.

Example #2

The maximum concentrations of benzene, toluene, and xylene in groundwater are 345, 5875, and 4765 ug/l (ppb) respectively. Monitoring wells are to be developed and sampled. Is there an air hazard? What are the respiratory protection and monitoring requirements?

The model (example spreadsheet #2) predicts that under saturated conditions, benzene will be at 5,675% of its exposure limit; toluene at 773 %, and xylene at 318%. The mixture is 6,766% of the exposure limit. Exposure to individual chemicals or their combination will be significant under “normal” conditions. An APR and monitoring with a PID/FID and a benzene tube is required. Action Levels could be:

PID/FID Reading	Action (Response)
Up to 1 ppm	Level D.
1 - 25 ppm	Level D; collect benzene tube; benzene action level not exceeded.
25-500 ppm	Level C; collect benzene tube; benzene action level not exceeded.
> 50 ppm	Level B.

Benzene Tube Reading	Action (Response)
0 - .50 ppm	Level D.
.50 - 1 ppm	Level D.
1 - 50 ppm	Level C.
>50 ppm	Level B.

The Level C and Level B total vapor upgrades are based on half of toluene’s TLV and half of the APR maximum use concentration. The benzene upgrades are based on OSHA’s benzene standard.



Attachment 5: Soil Macro

How to Use Soil Vapor Macro

Soil vapor macro is an EXCEL spreadsheet that relates a contaminant's soil concentration to its saturation air concentration.² Common compounds have chemical parameters pre-entered. To use:

- Enter the spreadsheet 9SOILVAPR.XLS).
- Check that the screen above the explanation contains the contaminants of concern. Import rows of information from the storage space below or add data as needed.
- Preset concentration (Column B) to "1E-09" using the copy function. Enter the highest concentration(s) of contaminants of concern. The results appear as soon as data is entered.

The results are interpreted as follows:

Saturation concentration is the worst case concentration of individual chemicals, with the sum appearing below.

If the **saturation concentration % exposure limit** is less than 100%, the compound is a problem only as part of mixture toxicity. If 100% - 500%, the compound is a problem in confined spaces. If 500% - 5,000%, the compound may be a problem during "normal" field operations (plenty of ventilation). If greater than 5,000%, exposure under "normal" field conditions may be significant, and should be evaluated. If the percent combined exposure limit (the sum) is below 100%, exposure above the limit is not possible, even in a confined space. The single compound exposure ranges discussed above also apply to the sum.

Example #3

The maximum soil concentrations of carbon tetrachloride, tetrachloroethane, and tetrachloroethylene are .023, .039, and .087 mg/kg (ppm) respectively. For soil sampling, do these materials present an air hazard? What are the respiratory protection and monitoring requirements?

The model (example spreadsheet #3) predicts that tetrachloroethylene (54%) will be the majority of saturated vapor present, followed by carbon tetrachloride (45%), and tetrachloroethane (1%). Under saturated conditions, carbon tetrachloride will be present at 78% of its exposure limit; tetrachloroethylene at 8%; and tetrachlorethane at 5%. The mixture represents 91% of the exposure limit. What this means is that even under worst-case (confined) conditions, exposure to the vapors of individual chemicals or their combination will be below the limit. Under normal field conditions (plenty of ventilation), exposures even further below the limit are anticipated. Respiratory protection is not required; the work could proceed in Level D. Representative air monitoring with a DRI should be periodically performed in several locations to confirm that the prediction is

² Block H2 has an organic carbon fraction of .02 pre-entered which will exaggerate vapor exposures from some soils. The exact fraction can be entered if it is known.

accurate. If anything unusual occurs (odors, symptoms of exposure, and so forth), the situation should be re-evaluated.

Example #4

With reference to example #3, chloroform is discovered at a maximum concentration of 0.156 mg/kg (ppm). For soil sampling is there now an air hazard? What are the respiratory protection and monitoring requirements?

The model (example spreadsheet #4) predicts that under saturated condition, chloroform will be present at 512% of its exposure limit. The mixture is 603% of the exposure limit. Vapor exposure to chloroform could be a problem under “normal” field conditions. The work could start in Level D, but an APR is needed in case of an upgrade. Monitoring with a PID/FID is required. Action levels could be:

PID/FID Reading	Action (Response)
Up to 1 ppm	Level D.
1 - 100 ppm	Level C. Confirm with chloroform tube.
> 100 ppm	Level B.

The model predicts that chloroform is a “borderline” problem under “normal” field conditions; an upgrade to Level C is unlikely. Since chloroform dominates the vapor, the Level C upgrade is based on half of chloroform’s PEL (2 ppm) to account for PID/FID reduced to straight-chain chlorinated hydrocarbons. Likewise, the Level B upgrade is based on half the maximum use concentration of the APR (2 ppm PEL x 100 protection factor). If sustained elevated PID/FID readings are observed, a chloroform detector tube must be used to confirm that the model is correct.

Attachment 6: Dust Macro

Soil Dust Macro

Soil dust macro is an EXCEL spreadsheet that relates a contaminant's soil concentration to its dust exposure limit in air.³ Common compounds have chemical parameters pre-entered. To use:

- Enter the spreadsheet (SOILDUST.XLS).
- Check that the screen above the explanation contains the contaminants of concern. Import rows of information from the storage space below or add data as needed.
- Enter the safety factor⁴ in block E4.
- Preset concentration (Column B) to "1E-09" using the copy function. Enter the highest concentration(s) of contaminants of concern. The macro calculates continuously; the results appear as soon as data is entered.

The results are interpreted as follows:

The **single compound exposure limit** is the concentration of total dust in air at which a single contaminant could be at its exposure limit.

The **dust exposure level for mixture** is the concentration of total dust in air at which the mixture of contaminants could be at its exposure limit.

Example #5

The maximum soil concentrations of chromium (hexavalent), mercury, PCBs, PNAs, and phthalates are 567, 23, 34, 100, and 215 mg/kg (ppm) respectively. For soil sampling, do these materials present an air hazard? What are the respiratory protection and monitoring requirements?

The following soil dust exposure limits are predicted (example spreadsheet #5):

Total Dust		
Contaminant	Exposure Limit	
Chrome (hex)	11,400	mg/m ³
Mercury	460	mg/m ³
PCBs	68	mg/m ³
PNAs	500	mg/m ³
Phthalates	43	mg/m ³
Mixture	24	mg/m ³

The mixture presents a hazard when total dust levels exceed 24 mg/m³. Phthalates account for most of the mixture toxicity. The OSHA nuisance dust PEL is 5 mg/m³; an APR would

³ The macro can be applied only to contaminants entrained in soil, and not for asbestos, volatile compounds, or fumes.

⁴ The safety factor can vary between 2 and 10. 4 has been pre-entered, meaning there is reasonable confidence that the soil data is accurate. If there is less confidence or no information about the quality of the data, use a factor of 10; conversely, better data could use a factor of 2.

be required when total dust reaches this level. A Miniram dust monitor could be used to determine total dust levels. Dust is visible at 2 - 3 mg/m³; dust suppression should be applied when dust becomes visible. This is consistent with prudent practice that suggests dust control should be practiced at one-half the exposure limit. Action levels could be:

Miniram Reading	Action (Response)
Up to 2.5 mg/m ³	Level D.
2.5 - 5.0 mg/m ³ (or visible dust)	Level D. Practice dust suppression.
> 5.0 mg/m ³	Level C.

Example #6

The maximum soil concentrations of chromium (hexavalent), mercury, PCBs, PNAs, and phthalates are 1116, 1023; 235; 5067; and 1878 mg/kg (ppm) respectively. For soil sampling, do these materials present an air hazard? What are the respiratory protection and monitoring requirements?

The following soil dust exposure limits are predicted (example spreadsheet #6):

Contaminant	Total Dust Exposure Limit
Chrome (hex)	11 mg/m ³
Mercury	12 mg/m ³
PCBs	532 mg/m ³
PNAs	10 mg/m ³
Phthalates	666 mg/m ³
Mixture	3.6 mg/m ³

The mixture presents a hazard when total dust levels exceed 3.6 mg/m³, slightly above the threshold of visible dust (2 - 3 g/m³). An APR would be required when dust reaches this level. A Miniram dust monitor could be used to determine total dust levels. Prudent practice suggests that dust control should be practiced at one-half the exposure limit or at about 2.0 g/m³. Action levels could be:

Miniram Reading	Action (Response)
Up to 2.5 mg/m ³	Level D.
2.5 - 3.6/m ³ (or visible dust)	Level D. Practice dust suppression.
> 3.6/m ³	Level C.

The mixture has significant toxicity; air sampling should be performed to confirm that the model is accurate



Attachment 7: Equipment Training Book

Air Monitoring Equipment Field Manual



CH2MHILL

Contents

Photoionization Detectors

- PIDs Calibration Summary Table
- Mini RAE
- TVA 1000
- OVN Datalogger
- Multi RAE

Flame Ionization Detectors

- FIDs Calibration Summary Table
- OVA 128
- TVA 1000

Combustible Gas Indicator

- CGI Calibration Summary Table
- MSA Model 260, 261

Photoionization Detectors

PIDs Calibration Summary Table

Probe	Gas	Reading	Span/ Response Factor (RF)	Calibration Methods
OVM Datalogger				
10.0eV	100 ppm isobutylene	100 ppm (RF=1.0)	Reset to 0.55	<ul style="list-style-type: none"> 1.5 L/min regulator; use T-tubing arrangement to connect to OVM. Flush and fill tedlar bag with calibration gas; connect directly to OVM.
11.8eV	100 ppm isobutylene	100 ppm (RF=1.0)	Reset to 0.68	<ul style="list-style-type: none"> Same as above.
Mini RAE				
10.0eV	100 ppm isobutylene	100 ppm (Clu=100.0)	Reset to 0.53	<ul style="list-style-type: none"> Use regulator and tubing supplied by manufacturer.
11.7eV	100 ppm isobutylene	100 ppm (Clu=100.0)	Reset to 0.68	<ul style="list-style-type: none"> Same as above.
TVA 1000				
10.6eV	100 ppm isobutylene	100 ppm (RF=1.00)	Reset to 1.32	<ul style="list-style-type: none"> 1.0 L/min regulator or greater; use T-tubing arrangement to connect to TVA 1000. Flush and fill tedlar bag with calibration gas; connect directly to TVA 1000.
11.7eV	100 ppm isobutylene	100 ppm (RF=1.00)	Reset to 0.68	<ul style="list-style-type: none"> Same as above.
Multi RAE				
10.6EV	100 ppm isobutylene	100 ppm	PID Sensor set to benzene in program mode	<ul style="list-style-type: none"> 1.0 L/min regulator; use direct tubing arrangement to connect to Multi RAE.
11.7EV	100 ppm isobutylene	100 ppm	PID Sensor set to benzene in program mode	<ul style="list-style-type: none"> Same as above.
CO, H ₂ S, LEL, O ₂	CO 50 ppm, H ₂ S 25 ppm, LEL 50%, O ₂ 20.9%	CO 50 ppm, H ₂ S 25 ppm, LEL 50%, O ₂ 20.9%		<ul style="list-style-type: none"> .5 L/min regulator; use direct tubing arrangement to connect to Multi RAE.

Note that all PIDs are initially calibrated to respond "one-to-one" by isobutylene (RF=1.0 or Clu=100.0). These factors should then be reset as used above.

Mini RAE



Calibration Check

Ready Instrument

- Check that the instrument was charged overnight.

Start Up Instrument

- Press the ON button.
- Observe "HG-1.31" on display, and observe pump startup. The display should now read "0.0". (This display can vary depending on model.)

Calibration Check and Adjustment

1. Press the MENU button to begin scrolling through the menu items. The display should read "Pd-0000", prompting the user for a password.
2. Press the ENTER button (four times) to accept "0000" as the password. DO NOT change the password.
3. With the display now reading "SA⁵025.0", press the MENU button to advance.
4. With the display now reading "TA⁶005.0", press the MENU button to advance.
5. With the display now reading "PA⁷005.0", press the MENU button to advance.
6. With the display now reading "CO⁸0.0", connect the zero-gas filter tube. Reset the zero gas calibration data by pressing the ENTER button once. Wait briefly, and continue to press the ENTER button until the display reads "CO 0.0 [or 0.1]".
7. Remove the zero-gas filter tube, and press the MENU button to advance.

⁵ SA=STEL Alarm

⁶ TA=TWA Alarm

⁷ PA=Peak Alarm

⁸ CO=Zero Gas Calibration

8. The display will read "Clu 100.0". To make instrument mimic the HNu, change the standard calibration gas value by pressing ENTER to scroll left to right. Change the flashing numbers as needed by pressing the "^" or "v" buttons. The display should read "Clu 53.0".
9. Once the ENTER key is pressed the fourth time to accept the calibration gas value, the display will read "GAS On".
10. Connect the 100-ppm isobutylene calibration gas with 0.5-LPM regulator with direct tubing or 1.5-LPM regulator and T-tubing, and press the ENTER button.
11. The display will read "CAL" for about 30 seconds, and then will read "Cl 100.0 [+5ppm]", indicating standard calibration gas value.
12. If the displayed result is not acceptable, continue to press the ENTER button to return to the calibration data to accept the displayed result.
13. Press the MENU button to exit calibration procedure, and disconnect the calibration gas.
14. Continue to press the MENU button to scroll through the "Clr ALL", "Hr xx.xx", and "dA xx.xx" displays. The display should read "0.0" once the user has scrolled through and exited the above menu items.

Troubleshooting

Troubleshooting Data		
Problem	Possible Reasons	Possible Solutions
1. Cannot turn on power after charging the battery	a. Bad battery connection b. Discharged battery c. Defective battery d. Microprocessor hang-up	<ul style="list-style-type: none"> • Check battery connection • Charge or replace the battery • Reset microprocessor by disconnecting, then reconnecting the battery • If unit is Mini RAE "Plus," check white switch between changing and RS232 ports
2. No LED or LCD back light	a. Defective LED or LCD back light	<ul style="list-style-type: none"> • Call authorized service center
3. Buzzer inoperative	a. Bad buzzer	<ul style="list-style-type: none"> • Call authorized service center
4. Reading abnormally high	a. Dirty or wet sensor b. Dirty probe assembly c. Dirty membrane filter	<ul style="list-style-type: none"> • Clean sensor module • Clean probe assembly • Replace membrane filter • Use water trap disk
5. Reading abnormally low	a. Lamp dirty or weak	<ul style="list-style-type: none"> • Clean or replace lamp
6. "Err xxx.x" message during operation	a. Dirty sensor b. Weak or defective lamp	<ul style="list-style-type: none"> • Clean sensor • Replace lamp, filter
7. Read a small background value	a. There is actually a background gas level b. Instrument zero drift	<ul style="list-style-type: none"> • Do zero-gas calibration
8. Reading jumps randomly	a. Incorrect gas calibration b. Low sensitivity to cal gas	<ul style="list-style-type: none"> • Recalibrate • Change filters • Clean lamp • Use different cal gas
9. Slow response to gas input	a. Leakage in probe assembly or sensor module	<ul style="list-style-type: none"> • Tighten the probe assembly and sensor module • Make sure "O" rings are present
10. No air draw at gas inlet tube	a. Defective pump or leakage in probe assembly and sensor module	<ul style="list-style-type: none"> • Replace pump, tighten the probe assembly and sensor module • Make sure "O" rings are present
11. "Lo bAt" message at power on	a. Discharged battery	<ul style="list-style-type: none"> • Recharge battery
12. Cannot turn off unit or corrupted characters in LCD display	a. Microprocessor hang-up	<ul style="list-style-type: none"> • Disconnect and reconnect battery • Reload software from PC
13. Full-scale measurement in humid environment	a. Dirty or wet sensor	<ul style="list-style-type: none"> • Clean and dry sensor • Use water trap disk to block out moisture
14. Measurement max out at certain level	a. Dirty lamp/sensor module b. Weak lamp	<ul style="list-style-type: none"> • Clean lamp/sensor module • Replace new lamp
15. Calibration error message	a. No standard gas input b. Low sensitivity to cal gas	<ul style="list-style-type: none"> • Make sure standard gas flows into inlet probe • Change calibration gas • Make sure calibration gas is attached during calibration

TVA 1000



Calibration Check

Ready Instrument

- Check that the instrument was charged overnight.

Start Up Instrument

- Press the ON button and verify that the instrument completes the self-diagnostic test, which takes approximately 15 seconds.
- To turn on pump, press "CONTROL".

Calibration Check and Adjustment

1. Press "2" and then press "1".
2. Press "2" to zero to ambient air. When the calibration is complete, the display will briefly display "ACCEPTED".
3. To select the gas concentration of the calibration gas, press "4".
4. To change the concentration to a new value, press "2".
5. Use the up and down keys to select %, ppm, ppb, and decimal point position. Then type the numerical value for the concentration. Press "ENTER" to store the value and press "EXIT" to return to the calibration menu.
6. From the calibration menu, set the span to 1.00 by pressing "5".
7. Use the up and down keys to select %, ppm, ppb, and decimal point position. Then type the numerical value for the concentration. Press "ENTER" to store the value and press "EXIT" to return to the calibration menu.
8. From the calibration menu, set the response factor to 1.00 by pressing "5".
9. To change the response factor to a new value, press "2".
10. Type "1.00" and press "ENTER" to store the value.

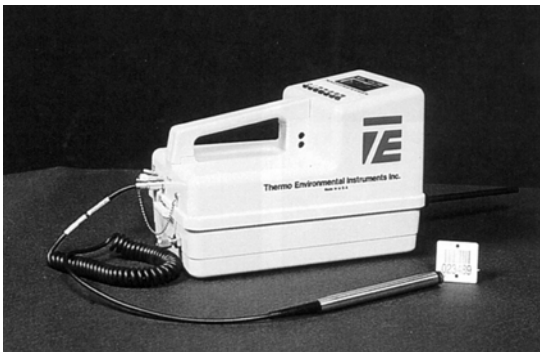
11. Press "EXIT" to return to the calibration menu.
12. Calibrate the instrument by pressing "3" and then "2".
13. Connect the span gas and then press "ENTER". When the calibration is complete, the display will briefly read "ACCEPTED".
14. Reset the response factor to 1.32 so that the TVA 1000 mimics the HNu by pressing "5".
15. To change the response factor to a new value, press "2".
16. Type "1.32" and press "ENTER" to store the value.
17. Press "EXIT" twice to return to the main menu.
18. To take a measurement, press "1".

Troubleshooting

When the analyzer is operating, dust or other foreign matter could be drawn into the probe, forming deposits on the surface of the UV lamp or in the ion chamber. This condition is indicated by meter readings that are low, erratic, unstable, non-repeatable, drifting, or show apparent moisture sensitivity. These deposits interfere with the ionization process and cause erroneous readings. Check for this condition monthly or as required. Detailed instructions are in the Handout.

- For a low battery, recharge the instrument.
- Fill the hydrogen tank by attaching the filling hose. Bleed the hose before filling or you will get high background readings.
- Charcoal filters are used to screen methane. Your action levels are based on non-methane readings, so you need to use the difference between the readings with and without the filter.
- High methane concentrations can result in false low readings of the PID.

OVM Datalogger



Calibration Check

Ready Instrument

1. Check to see what lamp is in the instrument.
2. Power-up instrument by plugging in the power plug or the charger cable.

Start Up Instrument

1. Press "ON/OFF" key to ignite lamp and initiate sample pump. The words "LAMP OUT" will be displayed until lamp is ignited. Unit is then operational.

Setting Zero

1. Press "MODE/STORE" key.
2. Using "-/CRSR" key, scroll through: "LOG THIS VALUE"-- "R/COMM"-- "CONC METER"-- "FREE SPACE"-- "RESET TO CALIBRATE." Display should read "RF=1.00".
3. If RF needs to be changed, hold down "RESET" while pressing "-/CRSR" to select cursor position. Then use "+/INC" key to set response factor (RF) to "1.00". Release RESET key only when selection is made.
4. Using "-/CRSR" key, scroll to "LAMP." Verify LAMP setting: If the setting needs to be changed, press "RESET", press "+/INC" for 10 EV LAMP. Press "-/CRSR" for 11 EV LAMP. Press "RESET".
5. Using "-/CRSR" key, scroll through "LAMP"-- "ALM"-- "AVERAGE"-- "LOC. CODE MODE"-- "AUTO LOGGING"-- "CONC METER"-- "FREE SPACE". Display should read "RESET TO CALIBRATE". Press "RESET" key.
6. Press "-/CRSR" in response to "RESTORE BACKUP" prompt.
7. Press "RESET" key. Instrument will zero to ambient air. (Note: Zero gas or a zero filter may be used to set the unit to an absolute zero -- connect prior to pressing "RESET" key.)

Calibration Check and Adjustment

1. Instrument should display "SPAN PPM = --- + TO CONTINUE".
2. Press "RESET" and "-/CRSR" keys simultaneously to select cursor position.

3. Press "RESET" and "+/INC" keys simultaneously to scroll through preset SPAN values. Set SPAN = 100, which corresponds to the 100 ppm isobutylene.
4. When span has been entered, press "+/INC" key to continue.
5. Connect span gas cylinder. Turn valve on. Press "RESET" key.
6. When finished calibrating, display will read "RESET TO CALIBRATE". Press "MODE/STORE" key. Display should read about 100 ppm. Turn valve off. Disconnect span gas cylinder.

Troubleshooting

When the analyzer is operating, dust or other foreign matter could be drawn into the probe, forming deposits on the surface of the UV lamp or in the ion chamber. This condition is indicated by meter readings that are low, erratic, unstable, non-repeatable, drifting, or show apparent moisture sensitivity. These deposits interfere with the ionization process and cause erroneous readings.

- If the battery is low, recharge the instrument.
- Drifting readings can mean that the lamp is dirty and needs to be cleaned.
- Humidity can cause false readings.
- High methane concentrations can result in false low readings.

Multi RAE



Calibration Check

For Multi RAE configured with O₂, LEL, H₂S, CO, sensors and a 10.6eV PID Lamp.

Start Up Instrument

- Press **Mode** button
- Observe displays:

On!.....	XX XX.X XX XX High XX.X
Multi RAE Version X.XX	XX XX.X XX XX Low XX.X
Model Number SN XXXX	XX XX.X XX STEL
Date Time Temp	XX XX.X XX TWA
Checking Sensor Ids....	Battery = X.XV Shut off at 4.2V
VOC Installed	User Mode=
CO Installed	Alarm Mode=
H ₂ S Installed	Datalog Time Left
OXY Installed	Datalog Mode
LEL Installed	Datalog Period
H ₂ S VOC CO LEL OXY	Unit ready in..... 10 Seconds
Alarm Limits=	

- The pump will start, the seconds will count down to zero, and the instrument will be ready for use.

Set Up Instrument to Respond to Benzene Standard

Depress the [N/-] key first, then while depressing the [N/-], depress the [Mode] key also and depress both keys for 5 seconds.

- Display will read:

Calibrate
Monitor?

- Press [N/-] 4 times. Display will read:

Change Sensor
Configuration ?

- Press [Y/+]. Display will read:

Change LEL/VOC
Gas Selection?

- Press [Y/+]. Display will read:

LEL gas = ?
Pentane, n-

- Press [Mode] and hold for 3 seconds.
Display will read:

VOC gas= ?
Isobutylene

- Press [N/-]. Display will read:

VOC gas= +/-
Isobutylene

- Press [N/-] until display reads:

VOC gas= +/-
Benzene

- Press [Mode] key. Display will read:

Save new gas?

- Press [Y/+]. Display will read:

Save new gas?
Saved!

Benzene
VOC factor= 53?

- Press [Y/+]. Display will read:

Change LEL/VOC
Gas Selection?

- Press [Mode] twice to return to main screen.
- Instrument is set to Benzene response factor!

Calibration Check and Adjustment

Allow instrument to warm up for 15 minutes.

- Depress the [N/-] key first, then while depressing the [N/-], depress the [Mode] key also and depress both keys for 5 seconds.

- Display will read:

Calibrate
Monitor?

- Press the [Y/+] key

- Display will read:

Fresh Air
Calibration?

- If "Zero Air" is necessary, attach the calibration adapter over the inlet port of the Multi RAE Monitor and connect the other end of the tube to the gas regulator (HAZCO loaner regulator LREG.5, RAE Systems P/N 008-3011 or suitable .5 LPM regulator) on the Zero Air bottle (HAZCO P/N SGZA, RAE P/N 600-0024). If no Zero Air is available, perform the Fresh Air Calibration in an area free of any detectable vapor.

- Press the [Y/+] key

- Display will read:

Zero....
In progress...

CO Zeroed!
Reading = X

VOC Zeroed!
Reading = X

LEL Zeroed!
Reading = X

OXY Zeroed!
Reading = X

Zero Cal done!
H₂S Zeroed!
Reading = X

In each of the above screens, "X" is equal to the reading of the sensor before it was zeroed.

- Display will then read:

Multiple Sensor
Calibration?

- Press the [Y/+] key

- The display shows all of the pre-selected sensors and the "OK?" question:

CO H₂S
LEL OK? OXY

- Apply calibration gas – use either HAZCO Services Part Number R-SGRAE4 or Rae Systems Part Number 008-3002 – using a .5 LPM regulator and “T” tubing.
- Press the [Y/+] key. Display will read:

Apply Mixed gas

Calibration
In progress ... 39

- The display will count down from 39 and then will read:

CO cal'ed
Reading=50

H₂S cal'ed
Reading=25

LEL cal'ed
Reading=50

OXY cal'ed
Reading=20.9

Calibration done
Turn off gas!

- Display will read:

Single Sensor
Calibration?

- Press the [Y/+] key.
- Display will read:

CO VOC H₂S
LEL pick? OXY

- Attach 100 ppm Isobutylene (HAZCO P/N r-SGISO or Rae P/N 600-0002) using a 1.0 LPM regulator (HAZCO P/N LR10HS or Rae P/N 008-3021). Open regulator.
- Press the [Mode] key once, the V of VOC will be highlighted.
- Press the [Y/+] key. The display will read:

Apply VOC Gas

Calibration
In progress...39

- Display will count down from 39, then display:

VOC cal'd Reading=100

Calibration done Turn off gas!

Single Sensor Calibration?

- Press **[Mode]** key twice to return to main screen.
- **CALIBRATION IS COMPLETE!**

Troubleshooting

As a general rule, if the readings are erratic, calibrate the PID. If this does not improve readings, clean the lamp.

Flame Ionization Detectors

FIDs Calibration Summary Table			
Gas	Span	Reading	Calibration Method
OVA 128			
100 ppm methane	3.0 ± 1.5	100 ppm	<ul style="list-style-type: none"> • 1.5 L/min regulator; use T-tubing arrangement to connect to OVA. • Do not use 0.25 L/min regulator as it does not provide sufficient flow. • Flush and fill tedlar bag with calibration gas; connect directly to OVA.
TVA 1000			
100 ppm methane	N/A	100 ppm	<ul style="list-style-type: none"> • 1.0 L/min regulator or greater; use T-tubing arrangement to connect to TVA 1000. • Flush and fill tedlar bag with calibration gas; connect directly to TVA 1000.

OVA 128



Calibration Check

Ready Instrument

- Check that the instrument is fully charged with hydrogen (99.999%).
- Check the battery condition by moving the INSTRUMENT switch to "BATT" –observe the needle response on the probe/readout assembly (Note: LIFT switches first, and then move).

Start Up Instrument

1. Move the INSTRUMENT switch to the "ON" position.
2. Set the CALIBRATION SCALE switch to the "X1" position.
3. Use the CALIBRATION ADJUST knob to set the probe/readout assembly to read zero.
4. Move the PUMP switch to the "ON" position. Check the SAMPLE FLOW RATE – the normal range is 1.5 to 2.5 LPM (if less, do not use). Check that there are no sample line leaks by placing finger over the probe inlet – the pump should stop – and then release finger.
5. Open the H₂ TANK VALVE and then H₂ SUPPLY VALVE. Allow approximately 5 minutes for the hydrogen to purge the system.
6. Ignite the flame by depressing the red igniter button on the left side of the instrument. Do not hold down for more than 5 seconds.
7. Once ignited, set the CALIBRATION ADJUST knob to set the probe/readout assembly to read zero.

Calibration Check and Adjustment

1. Set the CALIBRATION SCALE switch to the "X10" position.
2. Attach the 100 ppm methane cal-gas, using 1.5 LPM regulator with T-tubing to the instrument probe.

3. Unlock the GAS SELECT knob, and adjust to 3.0 ± 1.5 until probe/readout assembly reads 100 ppm. If the GAS SELECT setting is not within the acceptable range, do not use the instrument.
4. Detach the cal-gas. Before monitoring, set the probe readout assembly arbitrarily to 1 ppm. If the needle goes flat (to zero), the flame may have been extinguished. The flame must be re-ignited before using.

Troubleshooting

Troubleshooting Data		
Problem	Possible Procedure	Possible Solution
1. Low sample flow rate on flow indicator	a. Check Teflon tubing on valve assembly for kinks, etc.	Straighten or replace Teflon tubing.
	b. Check flow rate with valve in down position.	Check for over-restriction of charcoal filter.
2. Hydrogen flame will not light	a. Check column connections on top of unit to make sure they are tight.	Tighten fittings.
	b. Check column for sharp bends or kinks. (Hydrogen flows through this column at all times, and a sharp bend will compact packing too tightly for proper hydrogen flow.)	Replace column.
	c. Check charcoal filter fittings to make sure they are tight.	Tighten fittings.
	d. Check hydrogen flow rate from the column.	Adjust hydrogen pressure to obtain 12 cm ³ /min flow rate.
	e. Check that the inject and backflush valves are both completely in or out. A partially activated valve will block the hydrogen and air flow paths.	Ensure both valves are either completely in or out.
	f. If a new column was installed prior to identifying the problem, check for proper hydrogen flow rate through the column (should be approximately 12 cm/min).	Increase hydrogen pressure to obtain proper hydrogen flow rate, or if column is excessively restrictive, replace or repack the column.
	g. Allow time for hydrogen to reach ionization chamber.	Wait several minutes before igniting flame.
3. Ambient background reading in clean environment is too high	a. Check for contamination in charcoal filter assembly. This can be detected if ambient reading increases when going into the chromatographic mode.	Replace activated charcoal in charcoal filter assembly.
	b. Check for contamination in column.	Replace or clean column.
	c. Check for contamination in column valve assembly.	Remove valve stems and wipe with clean lint-free cloth. Heat valve assembly during operation to vaporize and remove contaminants.
4. Flame-out when operating either valve	a. Ensure valves are being operated with a quick, positive motion.	Operate valve with a positive motion.
	b. Either hydrogen or air may be leaking around one or more of the valve quad rings. Assess by tests and O-ring inspection.	Remove stems and lightly coat with silicone grease, only on contact surface of the O-ring. Wipe off excess (do not remove quad rings).
	c. Damaged or worn quad rings causing leak.	Replace quad rings and grease as above.

TVA 1000



Calibration Check

Ready Instrument

- Check that the instrument was charged overnight.
- Check that the cylinder is fully charged with hydrogen (99.999%).

Start Up Instrument

1. Press the ON button and verify that the instrument completes the self-diagnostic test, which takes approximately 15 seconds.
2. To turn on pump, press "CONTROL".
3. Press "1" to turn on pump.
4. To ignite the flame, open the hydrogen valve on the side of the instrument and wait 30 seconds. Press "CONTROL" and then "2". After "2" has been pressed, the main menu will be displayed.

Calibration Check and Adjustment

1. Press "2" and then press "1".
2. Press "2" to zero to ambient air. When the calibration is complete, the display will briefly display "ACCEPTED".
3. To select the gas concentration of the calibration gas, press "4".
4. To change the concentration to a new value, press "3".
5. Use the up and down keys to select %, ppm, ppb, and decimal point position. Then type the numerical value for the concentration. Press "ENTER" to store the value and press "EXIT" to return to the calibration menu.
6. From the calibration menu, set the span to 1.00 by pressing "5".
7. To change the response factor to a new value, press "3".
8. Type "1.00" and press "ENTER" to store the value.
9. Press "EXIT" to return to the calibration menu.
10. Calibrate the instrument by pressing "3" twice.

11. Connect the span gas and then press "ENTER". When the calibration is complete, the display will briefly display "ACCEPTED".
12. Press "EXIT" to return to the main menu.
13. To take a measurement, press "1".

Troubleshooting

When the analyzer is operating, dust or other foreign matter could be drawn into the probe, forming deposits on the surface of the UV lamp or in the ion chamber. This condition is indicated by meter readings that are low, erratic, unstable, non-repeatable, drifting, or show apparent moisture sensitivity. These deposits interfere with the ionization process and cause erroneous readings. Check for this condition monthly or as required. Detailed instructions are in the Handout.

- For a low battery, recharge the instrument.
- Fill the hydrogen tank by attaching the filling hose. Bleed the hose before filling or you will get high background readings.

Combustible Gas Indicator (CGI)

CGI Calibration Summary Table			
Gas	Zero	Reading	Calibration Methods
MSA 260, 261			
0.75% pentane	LEL= ambient background %O ₂ = 21.0%	50% LEL ± 5% LEL	<ul style="list-style-type: none"> • 1.5 L/min regulator; use direct tubing arrangement to connect to CG1 • Do not use 0.25 L/min regulator as it does not provide sufficient flow
HMX 271			
0.75% pentane	N/A	50% LEL ± 5% LEL	0.5 % 1/m reg. calibration cup

MSA Model 260, 261



Calibration Check

Ready Instrument

- Check that the instrument was charged overnight.
- Turn the FUNCTION knob to manual "HORN OFF" position.
- Verify that flow indicator is red.

Zero Instrument

- Zero the instrument within 30 seconds after turning instrument on. Set the readout to "00% LEL" by adjusting the ZERO LEL knob (Note: lift the knob first, then turn.)
- Set the readout to "20.8% OXY" by adjusting the CALIBRATE OXY knob.

Calibration Check and Adjustment

1. Connect cal-gas (0.75% pentane), with a 1.5 LPM regulator via direct tubing, to the sample port on the left side of the instrument.
2. Check that the readout is "50% LEL", + 5% LEL. If the "%LEL" is not within the acceptable range, do not use the instrument.
3. Check that the readout is "15% OXY", + 2% OXY. If the "%OXY" is not within the acceptable range, do not use the instrument.

Press the RESET button to clear alarm indicators.

Troubleshooting

- Flow problems. Should flow continue when the inlet is shut, a leak in the flow system is indicated. Stop off the flow at the pump inlet, making sure the pump stalls. Work back the flow path toward the sample inlet until the leak is identified.
- If during calibration-check procedures the readings do not fall within acceptable ranges stated above, internal calibration must be performed by a qualified individual.
- The user MUST be familiar with the instrument's limitations (e.g., interfering compounds that foul the detector, low-battery operation, readout latch, etc.).



Attachment 8: Summary of Calibration Procedures

Calibration Recordkeeping Requirements

The following calibration information must be documented in the project records for instrument calibration:

- Instrument name
- Serial Number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature and wind direction)
- Calibration readings
- Operators name and signature
- Date and time



Attachment 9: Air Sampling Pump Description

Air Sampling Pump Description

Hazard:	Specific organic and inorganic vapors, gases, and aerosols (dusts).
Application:	Determines concentration of specific chemical contaminants. This concentration is used to specify engineering controls and PPE requirements, and to demonstrate compliance with hazard (exposure) limits.
Components:	Constant-flow adjustable air sampling pump with appropriate collection media (sorbent tube or impinger).
Method:	Collection and concentration of contaminant on collection media.
Operation:	The air sampling pump causes air to be drawn through the collection media at a constant, predetermined flow rate. After a specified sampling time (typically 8 hours), the collection media is sent to a laboratory for analysis. The contaminant level is usually calculated as a time-weighted average (TWA).
Readout:	The TWA is usually reported as PPM or mg/m ³ .
Calibration:	Air sampling pumps must be calibrated to a primary air flow standard.
Limitations:	The air sampling duration is typically 8 hours, with laboratory analysis ranging from days to weeks; results are not available in real-time. Air sampling is expensive, with costs ranging from \$50 to \$500 per sample. Results must be compared to a hazard (exposure) limit for a specific chemical (for example, the PEL, REL, or TLV).



Attachment 10: Sample Pump Calibration Form

Sample Pump Calibration Form				
Date:				
Pump Number:				
Pre-Calibration:				
Flow 1:	liters/minute		Time:	am/pm
Flow 2:	liters/minute		Time:	am/pm
Flow 3:	liters/minute		Time:	am/pm
Average Flow:	liters/minute			
Post-Calibration				
Flow:	liters/minute		Time:	am/pm
Comments: 				
Calibration Performed By:				



Attachment 11: Air Sampling Pump Collection Form

Air Sampling Pump Collection Form				
Employee Name:		Date:		Sample Number:
Monitoring For:			Analytical Method:	
Time On:	am/pm	Time Off-	am/pm	Total Sampling Time
minutes				
Sampling Media:				
Sampling Rate: liters/minute				
Sample Volume: liters				
Work Activities			PPE In Use	
<input type="checkbox"/> Rounds and readings			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Product level measurements			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Product pumping			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Pressure washing			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Backwashing filters			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Cleaning treatment pad			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Collecting samples from treatment system			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Pulling pumps			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Checking or changing oil of pumps or equipment			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Stearn cleaning equipment			<input type="checkbox"/> Respirator/gloves/Tyvek	
<input type="checkbox"/> Other (Specify)			<input type="checkbox"/> Respirator/gloves/Tyvek	
Smoker: <input type="checkbox"/> Yes <input type="checkbox"/> No				
Comments:				
Sample Collected By:				



Attachment 12: Chain-of-Custody Form

**Industrial Hygiene
Chain-of-Custody Record**

_____ **Region**

Division Name: _____ **Telephone:** _____

Address: _____

City: _____ **State:** _____ **Zip:** _____

Collector's Name: _____ **Telephone:** _____

Send Results to:

Name: _____

Site: _____

Address: _____

Sample Submitted to: _____ **Date:** _____
(Laboratory)

SAMPLE NUMBER	SAMPLE DATE	MEDIA	SAMPLE VOLUME	ANALYSIS REQUIRED

Chain of Possession*:

1. _____	_____	_____
Signature of Sender	Title	Inclusive Dates
2. _____	_____	_____
Signature of Sender	Title	Inclusive Dates
3. _____	_____	_____
Signature of Sender	Title	Inclusive Dates

***Apparent gaps or breaks in the Inclusive Dates are covered by site sample shipping and receiving logs.**



Hand and Power Tools

Enterprise Standard Operating Procedure HSE-210

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups (BG) must comply, when using hand and power tools.

2.0 Scope and Application

2.1 Scope

This SOP provides information regarding hand and power tool hazards. CH2M HILL employees who are exposed to hand and power tool hazards must take precautions to avoid these hazards and be aware of hand and power tool safe-work practices and regulatory requirements.

The hazards addressed in this SOP cover those associated with hand and power tool use such as, but not limited to, falling, flying, abrasive, and splashing objects; exposure to dusts, fumes, musts, vapors, or gases; uncontrolled releases of energy (e.g. electrical, pneumatic, mechanical, etc.); and working in or near environments with flammable or combustible materials.

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental and Occupational Safety and Health (OSHA) programs may have more stringent requirements. Contact the appropriate Responsible Health and Safety Manager (RHSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by hand and power tools, regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);
- CH2M HILL provides oversight of subcontractor's using hand and power tools; and/or
- CH2M HILL employees use hand and power tools.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to hand and power tools:

- [HSE-206 -Electrical Safety](#)
- [HSE-403 - Hazardous Materials](#)
- [HSE-203 - Confined Space Entry](#)

3.0 Definitions

None

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the Site Manager (SM), or is designated by the SM to implement the project HSE Plan and who has successfully completed all required SC training. The SC trains CH2M HILL employees exposed to the hazards posed by hand and power tools, in hazard awareness and control procedures, as detailed in the site-specific health and safety plan. The SC serves as the competent person when CH2M HILL employees use hand and power tools. The SC also oversees subcontractor's using hand and power tools

5.0 Requirements

The following requirements outlined in this Enterprise SOP must be implemented.

5.1 Safe Work Practices

These safe work practices are to be followed by CH2M HILL employees who are exposed to the hazards posed by hand and power tools, regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

- Operate all tools according to the manufacturers' instructions and within design limitations.
- All hand and power tools shall be maintained in a safe condition.
- Tools are to be inspected and tested before use. If a tool is found to be defective it is to be tagged "Do Not Use" and removed from service until repaired.
- Personal protective equipment, such as gloves, safety glasses, earplugs, and face shields, are to be used when exposed to a hazard from the tool.
- Power tools are not to be carried or lowered by the cord or hose.

- Disconnect tools from energy sources when not in use, before servicing and cleaning, and when changing accessories such as blades, bits, and cutters.
- Safety guards on tools are to remain installed while the tool is in use and promptly replaced after repair or maintenance has been performed.
- Tools are to be stored properly, where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated (i.e., intrinsically safe, spark proof, etc.) for work in that environment.
- When using a knife or blade tool, stroke or cut away from the body with a smooth motion taking care not use excessive force that could damage tool, material being cut, or unprotected hands.
- Manual and pistol-grip hand tools may involve work with highly repetitive movement, extended elevation, constrained postures, or positioning of body members (e.g., hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool design, improved posture, selection of appropriate materials, work organization, and sequencing to prevent muscular skeletal, repetitive motion, and cumulative trauma stressors.

5.2 Regulatory and Industry Standards

The following subsections provide the minimum regulatory and industry standard requirements pertaining to the use of hand and power tools. These requirements apply when CH2M HILL is overseeing subcontractor's using hand and power tools and when CH2M HILL employees use hand and power tools.

5.2.1 Safety Equipment

The subcontractor is responsible for providing all personal protective equipment (PPE) necessary for its employees. CH2M HILL will only provide PPE for its own employees. Other safety equipment will be provided as delineated in the subcontract and referenced documents.

- Minimum personal protective equipment includes safety-toed shoes or boots, hard hats, and safety glasses.
- Task- and tool-specific PPE for protection from the hazard of falling, flying, abrasive, and splashing objects. Examples include face shield, goggles, and gloves.
- Hearing protection may be needed when working with power tools and in close proximity to equipment.

5.2.2 General Requirements

- Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard.

- Tools shall be tested each day before use to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.
- When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.
- Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a hazard.
- Machines designed for a fixed location shall be securely anchored to prevent walking or moving.
- Floor and bench-mounted grinders shall be provided with work rests, which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed one-eighth inch from the surface of the wheel.
- One or more methods of machine guarding shall be provided to protect the operator and other employees in a machine area from hazards such as those created by point of operation, in-going nip points, rotating parts, flying chips and sparks.
- The fluid used in hydraulic powered tools shall be fire-resistant fluids approved under Schedule 30 of the U.S. Bureau of Mines, Department of the Interior, and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.

5.2.2 Electric-Powered Tools

- Electric power operated tools shall be either double-insulated or equipped with a grounding conductor, and used in accordance with the Standard Operating Procedure HSE-206, "Electrical Safety".
- The use of electric cords for hoisting or lowering tools shall not be permitted.
- Do not use electric tools in damp or wet locations unless they are either approved for such locations or used with GFCI protection.
- All hand-held powered cylindrical sanders, grinders with wheels 2-inch diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks one-fourth of an inch wide or less may be equipped with only a positive "on-off" control.
- All hand-held powered drills; tappers; fastener drivers; horizontal, vertical, and angle grinders with wheels greater than 2 inches in diameter; disc sanders; belt sanders; reciprocating saws; saber saws; and other similar operating powered tools shall be equipped with a momentary contact "on-off" control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

- All other hand-held powered tools, such as circular saws, chain saws, and percussion tools without positive accessory holding means, shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.
- All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

5.2.3 Abrasive Wheel Tools

- All employees using abrasive wheels shall wear eye protection equipment (e.g., safety glasses, faceshields, goggles, etc.).
- All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.
- All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks or defects.
- All abrasive wheels greater than 2 inches in diameter can only be used on equipment or tools with safety guards.
- Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.
- Cup-type wheels used for external grinding shall be protected by either a revolving cup guard or a band-type guard. When the work location makes it impossible, a wheel equipped with safety flanges shall be used.
- Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges).
- When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of accidental breakage, shall be used.
- When safety guards are required on abrasive wheels tools, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage.
- The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees

5.2.4 Pneumatic-Powered Tools

- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.
- Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled

- All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment.
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
- The use of hoses for hoisting or lowering tools shall not be permitted.
- All hoses exceeding 1/2-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
- Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) shall be equipped with automatic or visible manual safety devices, which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released. In lieu of the above, a diffuser nut, which will prevent high pressure, high velocity release while the nozzle tip is removed, plus a nozzle tip guard, which will prevent the tip from coming into contact with the operator, or other equivalent protection, shall be provided.
- Blast cleaning nozzles shall be equipped with an operating valve, which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.
- Air receivers shall be so installed that all drains are easily accessible. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place.
- A drainpipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water.
- The drain valve on the air receiver shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.
- Every air receiver shall be equipped with an indicating pressure gauge (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent. No valve of any type shall be placed between the air receiver and its safety valve or valves.
- Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including environmental elements.
- All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

5.2.5 Liquid Fuel-Powered Tools

- All liquid fuel-powered tools shall be stopped while being refueled, serviced, or maintained, and fuel shall be transported, handled, and stored in accordance with Standard Operating Procedure HSE-403, "Hazardous Material."
- When liquid fuel-powered tools are used in confined spaces, the applicable requirements for concentrations of toxic vapors, use of personal protective equipment, and other hazard control methods referenced in Standard Operating Procedure HSE-203, "Confined-Space Entry" shall apply.
- The manufacturer's safe operating pressures for hoses, valves, pipes, filters, and other fittings shall not be exceeded.

5.2.6 Powder-Actuated Tools

- Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.
- Powder-actuated tools shall not be loaded until just prior to the intended firing time.
- Neither loaded nor empty tools are to be pointed at any employees.
- Hands shall be kept clear of the open barrel end.
- Loaded tools shall not be left unattended.
- Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.
- Powder-actuated tools shall not be used in an explosive or flammable atmosphere.
- All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.

5.2.7 Jacking Tools

- The manufacturer's rated capacity shall be legibly marked on all jacks and shall not be exceeded.
- All jacks shall have a positive stop to prevent over-travel.
- When it is necessary to provide a firm foundation, the base of the jack shall be blocked or cribbed.
- Where there is a possibility of slippage of the metal cap of the jack, a wood block shall be placed between the cap and the load.
- After the load has been raised, it shall be cribbed, blocked, or otherwise secured at once.

- Hydraulic jacks exposed to freezing temperatures shall be supplied with an adequate antifreeze liquid.
- All jacks shall be properly lubricated at regular intervals.
- Each jack shall be thoroughly inspected at times, which depend upon the service conditions.
- Inspections shall be not less frequent than the following:
 - For constant or intermittent use at one locality – once every 6 months.
 - For jacks sent out of shop for special work – when sent out and when returned.
 - For a jack subjected to abnormal load or shock – immediately before and immediately thereafter.
- Repair or replacement parts shall be examined for possible defects.
- Jacks, which are not working properly, shall be tagged accordingly, and shall not be used until repairs are made.

5.2.8 Hand Tools

- Wrenches, including adjustable, pipe, end, and socket wrenches, shall not be used when jaws are sprung to the point that slippage occurs.
- Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads.
- The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

5.2.9 Chain Saws

The following personal protective equipment shall be worn while operating chainsaws:

- Safety glasses with side shields or face shield to prevent injury from wood chips, sawdust, or other flying objects.
- Hard hat with properly fitted suspension to prevent head injury from falling debris.
- Steel-toed safety shoes or boots to prevent foot injury from falling objects and accidental contact with the moving chain.
- Hearing protection to prevent permanent damage to hearing. Ear muffs or plugs will have a decibel noise reduction rating (NRR) assigned to them. The higher the rating, the greater the protection offered.
- Non-leather, fabric work gloves to prevent hand injury from abrasions, splinters and cuts.
- Clothing that is well-fitted and free of loose edges that could become entangled in the saw.
- For extended chainsaw use, protective chaps or leggings that cover the area from the groin to about 2 inches above the ankles should be considered. These chaps are made

from synthetic fabrics that are designed to prevent the running saw chain from coming in contact with your legs

The following safe operation guidelines shall be followed regardless of the purpose for using a chainsaw:

- Operators shall read and follow the chainsaw operation and maintenance manual.
- Chainsaw handles shall be kept dry, clean, and free of oil or fuel mixture.
- Chainsaws shall be held firmly with both hands, with thumbs and fingers encircling both chain saw handles. The saw shall be gripped with the right hand on the rear (throttle) handle and the left hand on the front handle, even if left-handed. Chainsaws are designed to be used right-handed and it is potentially dangerous to use them left-handed. The saw shall be held parallel to the ground with the left arm straight for better control and to reduce the chance of kickback.
- Maintain a firm grip with both hands at all times when the saw is running.
- Stand slightly to the left side of the saw, out of the plane of the cutting chain and guide bar to reduce the risk of injury in the event of a kickback.
- Position saw so that it is between the waist and mid-chest level. Overreaching or cutting above the mid-chest height shall be avoided.
- Maintain a full throttle setting while cutting. Chainsaws are designed to be run at full speed.
- Be aware of proper chain tension. A loose chain may come off the guide bar and strike the operator.
- Always be aware of the position of the upper quadrant of the guide bar tip. Never lose sight of the tip of the guide bar or contact this part of the blade with anything being cut.
- Maintain the bumper spikes as close to the object as possible. These spikes are on the front of the motor housing and are provided to grip the wood and hold the saw in place while cutting.
- Always be aware of what is in the saw's downward path after the cut.
- Do not attempt to cut material that is larger than the guide bar of the saw.
- Avoid cuts that will cause the chainsaw to jam. Always cut into the compression wood first until the cut starts to close; then cut from the other side toward the compression cut.
- Use a non-metallic wedge to prevent the compression cut jamming on the blade.
- Chainsaws are designed to feed themselves into the wood and require only light pressure to cut efficiently. If extra force is required to keep cutting, the chain requires sharpening. Additional signs of a dull chain include a saw that is cutting crooked, results in fine sawdust instead of chips, or the smell of burnt wood. Do not use a dull chain.
- Bystanders and helpers shall be kept at a safe distance from operation.
- Do not operate a chainsaw when fatigued; take frequent breaks.

- Work slowly; don't rush.
- A fire extinguisher shall be present at all times when operating the chainsaw in forest or brushy areas.

5.3 Subcontractor HSE Oversight

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HSE regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

The "Subcontractor Safety Procedure Criteria – Hand and Power tools" presented in Attachment 1 provides the minimum criteria for subcontractor safety procedures. These criteria may be used by the HSE staff to review submitted subcontractor procedures when CH2M HILL is performing oversight of subcontractor's operations.

The subcontractor's supervisor serves as the overall competent person for construction activities. When the subcontractor uses hand and power tools, the subcontractor shall document that their employees are training in the safe use and operation of hand and power tools; inspect the tool before each use and operate, maintain and inspect the tool in accordance with the manufacturer's operations and maintenance manual.

5.4 CH2M HILL Self-Perform Requirements

When CH2M HILL employees use hand and power tools, they shall be trained in the safe use and operation of hand and power tools; inspect the tool before each use and operate, maintain and inspect the tool in accordance with the manufacturer's operations and maintenance manual.

The SC serves as the competent person, when CH2M HILL employees use hand and power tools on projects.

6.0 Training Requirements

CH2M HILL employees, who are exposed to the hazards posed by hand and power tools, are required to be trained in hazard awareness and control procedures by the SC, as detailed in the site-specific health and safety plan. The SC must successfully complete all CH2M HILL required SC training.

CH2M HILL employees, who work on construction projects, are required to complete the 10-Hour Construction Safety Awareness training course.

No special training requirements exist for hand and power tools (exception: powder-actuated tools). Manufacturer's recommendations shall be followed for the safe operation of all hand and power tools. CH2M HILL employees using powder-actuated tools must be trained in the operation of the particular tool in use. Training and certification are provided by the tool manufacturer.

Subcontractors are responsible for complying with all applicable HSE training regulations providing the training necessary to complete their tasks safely. Subcontractor training shall be verified prior to the start of field operations.

7.0 Forms, Permits and Checklists

The “HSE Self-Assessment Checklist – Hand and Power Tools in Attachment 2 may be used to verify subcontractor’s and CH2M HILL self-perform compliance with safety procedures, established practices, regulations, and industry standards. The RHSM specifies the frequency in which this checklist should be completed by the SC and provides this information in the project’s written safety plan. The RHSM may also use this checklist when performing HSE audits at CH2M HILL projects, including subcontractor’s activities.

8.0 References


None

9.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria-Hand and Power Tools](#)

Attachment 2 [HSE Self Assessment Checklist-Hand and Power Tools](#)

10.0 Revision Log

Revision	Date	Approved by	Prepared by	Approved by
1	10-17-2007	<p>Revised existing CH2M HILL SOP to apply when: employees are exposed to the hazard; oversight of subcontractor operations and CH2M HILL self-perform operations.</p> <p>SOP requirements include safe work practices and regulatory and industry standards pertaining to hand and power tool operations.</p> <p>Subcontractor Safety Procedures Criteria and HSE Self-Assessment Checklist are not mandatory, but are provided in the attachments as a tool to oversee subcontractor’s operations and to assess CH2M HILL self perform compliance with the SOP.</p> <p>Incorporate the existing Chainsaw SOP into the Hand and Power Tool SOP.</p>	Angelo Liberatore	



Attachment 1: Subcontractor Safety Procedure Criteria-Hand and Power Tools

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor hand and power tool procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Hand and Power Tool Safety Procedures:

1. Describe the method of training and qualifying personnel in the use of powder-actuated tools if such tools are to be used on the project.
2. Provide safe work practice guidelines on use and limitations for the types of hand and power tools to be used.
3. Provide a list of the types, work areas, and activities where special hand and power tools will be used.
4. Describe plans for the inspection of hand and power tools prior to introducing such tools to the work environment (i.e., tools brought on site by equipment rental vendors, home office storage facilities/yards, new purchases, employee supplied, etc.).
5. Provide a description of hand and power tool inspection criteria or procedures (frequency of inspections and items that are inspected).

The following safety procedures criteria, specifically applies to chain saw operations:

6. Provide qualifications of chainsaw operators (training, years and type of experience, etc.)
7. Describe personal protective equipment to be used by chain saw operators.
8. Describe safety equipment to be provided to ensure safe chain saw operation.
9. Describe inspection criteria or procedures (frequency of inspections per work shift, as needed throughout day; visual versus written inspections; items that are inspected).
10. Describe safe work practices (safe operation, refueling, maintenance, transport).
11. Describe methods of avoiding contact with overhead power-lines (contacting utilities, de-energizing and grounding, insulating, safe clearance distances).
12. Describe methods of protecting the public and others onsite (barricading, danger zone established, traffic control, etc.).
13. Describe safe work practices or procedures for the specific work to be performed (tree feeling, limbing standing trees, limbing fallen trees, bucking trees, etc.).



Attachment 2 - HSE Self-Assessment Checklist—HAND AND POWER TOOLS Page 1 of 4

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are exposed to hand and power tool hazards and/or (2) CH2M HILL provides oversight of subcontractor personnel who are exposed to hand and power tool hazards.

SC may consult with subcontractors when completing this checklist, but shall not direct the means and methods of hand and power tool use nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposure to hand and power tool hazards.
☐ Evaluate a CH2M HILL subcontractor's compliance with hand and power tool requirements.
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-210.

SECTION 1

Yes No N/A N/O

SAFE WORK PRACTICES (5.1)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. All tools operated according to manufacturer's instructions and design limitations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. All hand and power tools maintained in a safe condition and inspected and tested before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Defective tools are tagged and removed from service until repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. PPE is selected and used according to tool-specific hazards anticipated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Power tools are not carried or lowered by their cord or hose. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Tools are disconnected from energy sources when not in use, servicing, cleaning, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Safety guards remain installed or are promptly replaced after repair. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Tools are stored properly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Cordless tools and recharging units both conform to electrical standards and specifications. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Tools used in explosive environments are rated for such use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Knife or blade hand tools are used with the proper precautions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stressors. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 2
Yes No N/A N/O
GENERAL (5.2.2)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 13. PPE is selected and used according to tool-specific hazards anticipated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Tools are tested daily to assure safety devices are operating properly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Damaged tools are removed from service until repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Power operated tools designed to accommodate guards have guards installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Rotating or moving parts on tools are properly guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Machines designed for fixed locations are secured or anchored. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Floor and bench-mounted grinders are provided with properly positioned work rests. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Guards are provided at point of operation, nip points, rotating parts, etc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Fluid used in hydraulic-powered tools is approved fire-resistant fluid. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ELECTRIC-POWERED TOOLS (5.2.3)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 22. Electric tools are approved double insulated or grounded and used according to SOP HSE-206. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Electric cords are not used for hoisting or lowering tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Electric tools are used in damp/ wet locations are approved for such locations or GFCI installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Hand-held tools are equipped with appropriate on/off controls appropriate for the tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Portable, power-driven circular saws are equipped with proper guards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ABRASIVE WHEEL TOOLS (5.2.4)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 27. All employees using abrasive wheel tools are wearing eye protection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. All grinding machines are supplied with sufficient power to maintain spindle speed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Abrasive wheels are closely inspected and ring-tested before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Grinding wheels are properly installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Cup-type wheels for external grinding are protected by the proper guard or flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Portable abrasive wheels used for internal grinding are protected by safety flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Safety flanges are used only with wheels designed to fit the flanges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Safety guards on abrasive wheel tools are mounted properly and of sufficient strength. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

PNEUMATIC-POWERED TOOLS (5.2.5)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 35. Tools are secured to hoses or whip by positive means to prevent disconnection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Safety clips or retainers are installed to prevent attachments being expelled. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Safety devices are installed on automatic fastener feed tools as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Compressed air is not used for cleaning unless reduced to < 30 psi, with PPE, and guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Manufacturer's safe operating pressure for hoses, pipes, valves, etc. are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Hoses are not used for hoisting or lowering tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. All hoses >1/2-inch diameter have safety device at source to reduce pressure upon hose failure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Airless spray guns have required safety devices installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Blast cleaning nozzles are equipped with operating valves, which are held open manually. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Supports are provided for mounting nozzles when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Air receiver drains, handholes, and manholes are easily accessible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Air receivers are equipped with drainpipes and valves for removal of accumulated oil and water. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Air receivers are completely drained at required intervals. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Air receivers are equipped with indicating pressure gauges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Safety, indicating, and controlling devices are installed as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Safety valves are tested frequently and at regular intervals to assure good operating condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

HSE Self-Assessment Checklist—HAND AND POWER TOOLS**Page 3 of 4****SECTION 2 (continued)****Yes No N/A N/O****LIQUID FUEL-POWERED TOOLS (5.2.6)**

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 51. Liquid fuel-powered tools are stopped when refueling, servicing, or maintaining. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Liquid fuels are stored, handled, and transported in accordance with SOP HSE-403 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Liquid fuel-powered tools are used in confined spaces in accordance with SOP HSE-203. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Safe operating pressures of hoses, valves, pipes, filters, and other fittings are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

POWDER-ACTUATED TOOLS (5.2.7)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 55. Only trained employee operates powder-actuated tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Powder-actuated tools are not loaded until just prior to intended firing time. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Tools are not pointed at any employee at any time. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Hands are kept clear of open barrel end. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Loaded tools are not left unattended. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Fasteners are not driven into very hard or brittle materials. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Fasteners are not driven into easily penetrated materials unless suitable backing is provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Fasteners are not driven into spalled areas. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Powder-actuated tools are not used in an explosive or flammable atmosphere. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. All tools are used with correct shields, guards, or attachments recommended by manufacturer. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

JACKING TOOLS (5.2.8)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 65. Rated capacities are legibly marked on jacks and not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Jacks have a positive stop to prevent over-travel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. The base of jacks are blocked or cribbed to provide a firm foundation, when required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Wood blocks are placed between the cap and load to prevent slippage, when required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. After load is raised, it is cribbed, blocked, or otherwise secured immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. Antifreeze is used when hydraulic jacks are exposed to freezing temperatures. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. All jacks are properly lubricated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. Jacks are inspected as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. Repair or replacement parts are examined for possible defects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 74. Jacks not working properly are removed from service and repaired or replaced. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

HAND TOOLS (5.2.9)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 75. Wrenches are not used when jaws are sprung to the point of slippage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 76. Impact tools are kept free of mushroomed heads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 77. Wooden handles of tools are kept free of splinters or cracks and are tightly fitted in tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

CHAIN SAWS (5.2.10)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 78. Chainsaw equipped with spark arrestor and fully functioning chain brake | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 79. Chainsaw operator's manual readily available | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 80. Fully stocked first aid kit and multipurpose fire extinguisher available | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 81. Appropriate personal protective equipment available and worn | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 82. Clothing free of loose edges that could become entangled in the saw | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 83. Chainsaw handles kept dry, clean, and free of oil or fuel mixture | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 84. Chainsaws held firmly with both hands and used right-handed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 85. Operator standing to the left of the saw out of the plane of the chain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 86. Saw used between the waist and mid-chest level | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 87. Full throttle maintained while cutting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 88. Operator aware of position of guide bar tip, does not contact tip with anything being cut | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 89. Bumper spikes maintained as close to the object as possible | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 90. Operator aware of what is in the saw's downward path after the cut | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 91. No attempt to made to cut material that is larger than the guide bar of the saw | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 92. Cuts avoided that will cause chain to jam | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 93. Non-metallic wedges used to prevent compression cuts from jamming the blade | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 94. Bystanders and helpers kept at a safe distance from operation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 95. Chainsaw not operated when fatigued | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 96. Fire extinguisher present when operating the chainsaw in forest or brushy areas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

[illegible]

HSE-210 VERSION 1 – A2



[Click here for Attachments](#)

Contracts and Subcontracts

Enterprise Standard Operating Procedure HSE-215

1.0 Purpose

The purpose of this Enterprise Standard Operating Procedure (SOP) is to describe requirements CH2M HILL Legal Entities and Business Groups must comply with when performing activities within the scope of this SOP. The CH2M HILL HSE Policy directs projects to consistently deliver services in a safe and environmentally protective manner. This SOP applies to the work we do **and** to the work that others do on our behalf.

1.1 Regulatory Review

This SOP addresses CH2M HILL's HSE management practices on field project sites. HSE management practices must be consistent with HSE responsibilities, which are, in general, established by:

- **Contract:** Scope and responsibilities are established and documented through mutual agreement of the contracting parties.
- **Law:** All employers have a legal responsibility for the safety of their own employees, but may also have varying degrees of responsibility under the law for the safety of other employees.
- **Site Practices:** Responsibilities are established by the actual job-site practices of the parties involved in the work. Contract terms are interpreted through 1) the written contract itself, and 2) actual work practices. Therefore, it is critical that our site practices follow written contract terms because our actions in the field can override those terms. For example, if our staff are reviewing and approving safety plans, or if they direct the means and methods of the work, we may have assumed responsibility for the safety of third parties even though our contract indicates otherwise.

Most jurisdictions have "employer categories" that assign safety responsibilities on multiparty or multi-employer work sites. The practices described in this SOP are designed to ensure that CH2M HILL's contracts, insurance coverage, project plans, staffing, and operating practices are consistent with applicable employer categories.

2.0 Scope and Application

This SOP applies enterprise-wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some jurisdictions may have more stringent requirements. Contact the appropriate Responsible Health and Safety Manager (RHSM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-

specific regulations (e.g., Canada or Australia) shall prevail, and a country-specific SOP should be developed to comply with these specific regulations.

This SOP describes HSE management practices for CH2M HILL staff, subcontractors, and third-party individuals on CH2M HILL field projects. The following parties may be present on CH2M HILL field projects (as illustrated in Attachment 1):

- CH2M HILL staff
- CH2M HILL subcontractors
- Third parties not subject to CH2M HILL HSE oversight (e.g., contractors or suppliers hired by the client and working alongside CH2M HILL on a project site)
- Third parties subject to CH2M HILL oversight (e.g., when CH2M HILL's contract explicitly includes an HSE oversight role, as in "at risk" construction management). CH2M HILL third-party HSE oversight requires prior approval and implementation of appropriate practices as described in Attachment 2.

3.0 Definitions

3.1 Construction Management

Construction management (CM) occurs on projects where the owner's contractor performs construction, with CH2M HILL providing specific services defined in the contract with the client. The scope of CM services can be limited to contractor coordination and information management for the owner, or it can be broad enough to include complete planning, scheduling, and direct control of site operations. Third-party CM involves providing CM services on projects where CH2M HILL did not provide the original design services.

3.2 Construction Services

Construction services are a subcategory of field services. Services are designated as "construction" based on the nature and purpose of the work being performed.

3.3 Contractor

A contractor is a firm that has a contract with someone other than CH2M HILL or our subcontractors.

3.4 EPC Contractor

Engineering, Procurement and Construction (EPC) contractors are responsible for all phases of a project and act on behalf of the client. EPC contractors are usually responsible for overall site safety.

3.5 Prime Contractor

A prime contractor is contracted directly to the owner under a prime contract, such as the prime contract between CH2M HILL and the owner, and is generally assigned responsibility for a specific work scope, portions of which may be subcontracted to others for performance.

3.6 General Contractor

General Contractor (GC) is an industry term applied to the specific category of prime contractor generally assigned overall responsibility for a construction project, including procurement and management of the work scope to be self-performed or delivered through subcontractors hired by the GC. Therefore, GCs have broad responsibilities for overall site-wide HSE management.

3.7 Field Work

Field work includes any CH2M HILL staff activity conducted outside of the office environment. Examples include construction supervision, equipment operation, sampling, inspection, assessment, and surveying. Field work can be as minor as a “couple-day” engineering evaluation, a walk-through at the client’s facility, or an occasional check on someone else’s field work (where CH2M HILL controls its own scope and methods). However, a “windshield” or escorted tour for a proposal (where the escort controls the scope and methods) or a visit to a field office only (where the exposure to hazards is limited), are not considered field work.

3.8 HSE Management Practices

HSE management practices support the implementation of measures to protect worker health and safety and the environment during field projects. HSE management practices involve delineating, organizing, and managing the HSE roles and responsibilities of all parties involved in the work. These parties may include our client, CH2M HILL staff, our subcontractors, third-party contractors and suppliers, and other entities not affiliated with CH2M HILL. HSE management practices are implemented by all parties, who acknowledge and implement their HSE responsibilities consistent with applicable laws and regulations. The HSE management practices of all parties should not overlap, conflict or allow gaps in HSE protection that might result in incomplete hazard and impact resolution. CH2M HILL’s HSE management practices include safety-based selection of our subcontractors and requirements for safe work procedures, contract language, insurance coverage, training and medical certifications, and operational oversight. Our practices involve managing interfaces and communications with our clients and with third parties on the job site.

3.9 Imminent Danger

Imminent danger signifies a condition or impending event that could cause death, serious injury, or serious environmental or property damage in the immediate future if corrective measures are not taken immediately.

3.10 Incident

An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness
- Spill or release
- Damage to property
- Environmental violation (e.g., permit exceedance)
- A “near-miss”

- Other (e.g., fire, explosion, bomb threat, workplace violence)

See Incident Reporting and Investigation SOP [HSE-111](#) for more information on incidents.

3.11 Services During Construction

Services during construction (SDC) are engineering services on projects designed by CH2M HILL, where CH2M HILL assists in administering the construction contract to verify that a contractor's work is in substantial compliance with the contract documents. SDC are distinguished from CM (see definition above) by their lower level of interaction with the contractor(s); SDC focus on the outcome of the contractor's work rather than on influencing its delivery.

3.12 Subcontractors

Subcontractors may be firms contracted to CH2M HILL or to other CH2M HILL subcontractors (i.e., lower-tier subcontractors).

4.0 Roles and Responsibilities

4.1 Business Group Health, Safety and Environmental Leads

The Business Group Health, Safety and Environment (BG HSE) Leads are responsible for assisting the project manager (PM), contracts administrator (KA), and the subcontract administrators (SCA) in implementing this SOP for all projects in their BG. The BG HSE Lead also has the authority to approve deviations from this standard to meet local government regulations and specific HSE requirements that are more stringent than this standard. BG HSE Leads may, depending on BG organizational structure, include one or more individuals (e.g., Health and Safety Manager/Director and Environmental Manager/Director).

4.2 Business Group Operations Lead

The BG Operations Lead or designee is responsible for reviewing subcontractors that do not meet CH2M HILL HSE pre-qualification criteria and granting/rejecting a project specific exception/deviation for a given subcontractor, with the concurrence of the BG HSE Lead.

4.3 Project Manager

The CH2M HILL PM is responsible for ensuring that applicable portions of this SOP are implemented on their projects. The PM is also responsible for providing adequate resources (budget and staff) for project HSE. The PM has overall responsibility for the HSE Site Management process described in this SOP. The PM is responsible for:

- Providing the SCA with information so that standard terms and conditions, subcontractor information and contract-specific HSE roles and responsibilities are included in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors)
- Maintaining copies of subcontract documents (e.g., training, medical monitoring records and procedures) in the project file, accessible to site personnel
- Implementing the site-specific health and safety plan

- Managing the site and interacting with third parties in a manner consistent with our contract and subcontract agreements

4.4 Proposal Manager

The CH2M HILL Proposal Manager is responsible for submitting the Project/Program Fact Sheet (PFS) to the BG HSE Lead or their designee for comments regarding HSE risk, scope, schedule and cost, consistent with Policy 304, and engage the BG HSE Lead or designee in the development of the Risk Register as needed. For projects not subject to the PFS process, the proposal manager, client service manager or other person responsible for the pursuit of a new business opportunity shall contact the BG HSE Lead or their designee for evaluation as needed.

4.5 Site Manager

The CH2M HILL Site Manager (SM) is responsible for all field operations onsite and is typically the Construction Manager (CM), Site Superintendent, Site Supervisor or Field Team Leader. The SM is directly responsible for implementing all aspects of the project H&S plan, as assigned by the PM.

4.6 Contract Administrator

The CH2M HILL Contract Administrator (KA) is responsible for assisting the PM with administration of the Prime Contract between CH2M HILL and the owner, including oversight of the procedures to be used on the project for managing prime contract related risk. The KA assists the PM with ensuring that the prime contract reflects a consistent assignment of HSE responsibilities.

4.7 Subcontract Administrator

The CH2M HILL SCA is responsible for the following, as delegated by the PM, assigned by the business group, or mandated by company procedures:

- Including standard terms and conditions, as well as contract-specific HSE roles and responsibilities, in subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Implementing the subcontractor prequalification process by:
 - Determining if a current (within the past year), an accepted subcontractor HSE performance questionnaire (Attachment 3) or the equivalent Enterprise Procurement subcontractor pre-qualification questionnaire (form CH-P05-0302-F1) containing the safety performance questions has been completed, and the subcontractors safety qualifications have been accepted by the RHSM prior to sending a request for proposal (RFP) or executing a subcontract.
 - Obtaining completed questionnaires from prospective bidders and providing them to RHSM for acceptance, allowing 3-5 business days to complete.
- Implementing the subcontractor selection process by:
 - Including any required HSE information needed for evaluation of the proposal and selection of the subcontractor or supplier in the bid documents.

- Including HSE Subcontractor Safety Procedure Criteria documents in subcontract agreements, as appropriate.
- Seeing that appropriate site-specific safety procedures, training, and medical monitoring records are provided, reviewed and accepted by the RHSM prior to the start of subcontractor field operations. The subcontractor shall not be permitted to start work until the RHSM/REM indicates the subcontractor procedures, training and medical monitoring records are accepted.
- Maintaining copies of subcontractor qualification documents.

4.8 Responsible Business Group Health and Safety Manager (RHSM)

The RHSM is the HSM assigned by the BG HSE Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the CH2M HILL project H&S plan, reviews subcontractor H&S plans and submittals, conducts project H&S audits and provides H&S support and guidance to the project.

The RHSM is responsible for the following:

- Routing subcontractor prequalification questionnaires with environmental issues to the REM for evaluation
- At the request of the SCA, confirming that a prospective bidder/proposed subcontractor has a current (within the past year), approved subcontractor safety performance questionnaire, using the enterprise approved subcontractor database
- Prequalifying subcontractors based on the criteria in section 5.5.2 within a reasonable timeframe (3-5 business days)
- Reviewing or developing risk management measures as needed to support project-specific exemptions or deviations from standard prequalification criteria.
- Reviewing and accepting subcontractor training and medical monitoring records and site-specific safety procedures prior to start of a subcontractor's field operations
- Supporting the safety coordinator's oversight of subcontractor (and lower-tier subcontractors) HSE practices and interactions with onsite third parties per the site-specific safety plan (BG HSE Lead may also provide direct oversight of subcontractors)
- Assists the PM with updates the HSE portion of the Risk Register from contract award through project close-out as needed.

4.9 Business Group Environmental Manager

The BG Environmental Manager (EM) is responsible for assisting the PM and SCA in implementing this SOP for all projects in their BG. The BG EM advises the BG HSE Lead on deviations from this standard to meet local government regulations and specific environmental program requirements that are more stringent than this standard.

4.10 Responsible Environmental Manager (REM)

The REM is the EM assigned by the BG EM to provide environmental compliance technical guidance and support to the project.

The REM is responsible for the following:

- Reviewing and prequalifying subcontractors based criteria in section 5.2.2 as necessary.
- Reviewing or developing risk management measures as needed to support project-specific exemptions or deviations from standard prequalification criteria.
- Review environmental performance of transportation and disposal subcontractors and approve use based on project specific requirements
- Supporting the project manager and safety coordinator in implementation of HSE practices

4.11 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the SM, or is designated by the SM in consultation with the RHSM to implement the project H&S Plan and who has successfully completed all required SC training.

The SC responsibilities include:

- Verifying that, prior to the start of any subcontractor's field operations, project files are available to site personnel and include copies of executed subcontracts and subcontractor training and medical monitoring records, and site-specific safety procedures
- Performing oversight or assessments (or both) of subcontractor HSE practices per the site-specific safety plan
- Administering the HSE program at the site and interacting with contractors and other third parties in a manner consistent with our contract or subcontract agreements and the applicable standard of reasonable care
- Coordinating with the RHSM and REM regarding CH2M HILL and subcontractor HSE performance, as well as third-party interactions
- Continuously and fully implementing HSE policies and procedures, through the implementation of the project HSE plan.
- The SC may have additional responsibilities in the project HSE plan.

4.12 CH2M HILL Employees

All employees are responsible for implementing safe work practices, complying with this SOP and project HSE requirements. Employees must inform the PM or SC of observed subcontractor nonconformance or third party noncompliance.

5.0 Procedures

The following procedures incorporate responsibilities for HSE management practices into our contracts and subcontracts and help keep our site practices consistent with contract terms and applicable requirements.

5.1 Project Pursuit and Proposal

CH2M HILL's responsibility for HSE must be identified early during the pursuit and acquisition of opportunities that have a field-work component or may impact the environment. CH2M HILL's proposed responsibility for HSE performance must not exceed acceptable levels of risk to CH2M HILL.

BG HSE Leads or their designee shall engage in the PFS process and assist in the development of the Risk Register regarding HSE risk, scope, schedule, and cost as needed. For programs or projects not subject to the PFS process, the proposal manager, client service manager or other person responsible for the pursuit of a new business opportunity shall contact the BG HSE Lead or designee for evaluation as needed.

The BG HSE Lead or designee shall evaluate the opportunity and make recommendations based on CH2M HILL HSE policies:

- **Employees:** CH2M HILL always accepts responsibility for the safety and health of our employees, even when another party is responsible for implementing a safety program that covers CH2M HILL staff.
- **Subcontractors:** CH2M HILL subcontractors retain direct responsibility for the health, safety, and environmental performance of their own staff. However, CH2M HILL has ultimate responsibility for our prime contract with the client, and our level of oversight will vary depending upon subcontractor level of experience and risks posed by services, as discussed in Section 5.4.
- **Third Parties:** CH2M HILL will not accept responsibility for third-party HSE performance (e.g., by acting as third-party construction manager) unless prior approval is obtained and appropriate practices are implemented as described in Attachment 2.

Opportunities that deviate from these policies shall be submitted to the BG HSE Lead for review and approved by the BG Operations Lead.

5.1.1 Construction Management

Third parties are solely responsible for the safety of their workers and subcontractors. However, there are two exceptions to this situation. The first involves assignment of contractual responsibility to CH2M HILL for a contractor's HSE performance, a situation that is undesirable unless it includes

- Increased commensurate contractual authority over the contractor,
- Indemnification of CH2M HILL by the contractor,
- Coverage of CH2M HILL under the contractor's insurance,
- Assignment of a full-time project HSM to perform contractor HSE oversight and increased compensation to offset the additional risk.

Contracts which assign CH2M HILL responsibility for contractor HSE performance must be reviewed by the Legal and Insurance Department (LID) and approved by BG Operations Leads.

The second exception **can** occur when CH2M is the construction manager and designates the site construction manager as a controlling employer. If the construction manager is designated as a controlling employer, regardless of contractually disclaimed safety responsibilities, then the construction manager may be held liable for the contractor's regulatory violations, or worker injuries, or both.

Consult Attachment 2 when CH2M HILL contracts to provide CM services.

5.2 Contracts and Subcontracts Administration

This section describes HSE management processes that apply to executing contracts and subcontracts.

5.2.1 Executing the Prime Contract with the Client

The PM is responsible for working with the KA, legal counsel, RHSM and REM to select the appropriate standard contract and describe CH2M HILL responsibilities for HSE performance in the prime contract with the client.

When other contractors will be present at the job site, the PM must work with the client so that all contracts reflect the consistent assignment of HSE responsibilities. If this is not possible, the PM must consult with the RHSM, BG PD team and LID to implement any of the following:

- Develop additional site management practices for the site-specific written HSE program;
- Modify the standard contract form to include negative scope statements (i.e., stating what CH2M HILL is not responsible for) to further clarify roles and responsibilities;
- Seek to be named as additional insured on the contractor's (and their subcontractors) insurance policies, with indemnification by the contractor and subcontractors.

In the majority of contracting situations, other contractors are solely responsible for the safety and environmental performance of their workers and subcontractors. However, CH2M HILL may assume this responsibility (e.g., when serving as general contractor or providing construction management at risk) only if appropriate contractual terms are included and prior approval is obtained, as directed in the Policy 312, Health and Safety Services Policy Instruction, 312-1.

5.2.2 Pre-qualification of Subcontractors

All subcontractors who will work on CH2M HILL project sites shall be pre-qualified to meet HSE performance expectations. It is preferred that proposed subcontractors be pre-qualified prior to sending them an RFP or bid request. In any case, the proposed subcontractors shall be pre-qualified prior to executing a subcontract agreement with CH2M HILL. The pre-qualification process determines whether a potential subcontractor meets or does not meet the standard prequalification criteria.

An HSE pre-qualification questionnaire is required to be completed by all subcontractors performing field work on CH2M HILL projects. Completed questionnaire are forwarded to the RHSM for approval within 3-5 business days prior to sending an RFP. The RHSM shall forward questionnaires indicating Environmental program issues to the REM for environmental evaluation.

The RHSM/REM shall:

1. Evaluate the subcontractor against the evaluation criteria below
2. Inform the SCA of subcontractor status (qualified, not qualified? or project-specific exception/deviation)
3. Indicate evaluation results on the questionnaire or otherwise document and provide them to the SCA.

Subcontractor evaluation criteria:

- **Fatalities:** No fatalities in the last 3 years.
- **Incident Rates:** The 3 year average must be at or below the industry average North American Industry Classification System (NAICS) for subcontractor's industry for both TRR and DART.
- **EMR:** The three year average must be at or below 1.0.
- **HSE Violations:** No OSHA citations (H&S violations) and Notice of Violations (Environmental violations) in the last 3 years.
- **Training:** Must be appropriate to the type of work the subcontractor performs.
- **Substance Abuse Program:** Must have a Drug Free Workplace Program that meets CH2M HILL requirements.
- **Transport Sub:** Must have satisfactory safety rating by USDOT or state.
- **Disposal Sub:** No uncontrolled releases; no sites on the National Priorities List (NPL) or other contaminated sites list.

5.2.3 Exceptions to Standard Prequalification Criteria

Subcontractors that do not meet the standard prequalification criteria described above must be reviewed and approved by the BG Operations Lead and BG HSE Lead. The review/approval is project or task-specific and should include risk mitigation measures. The Subcontractor HSE Prequalification Exception to Standard Evaluation Criteria form in Attachment 4 may be used by the BG for this process.

5.2.4 Lower-Tier Subcontractors

CH2M HILL's subcontract (Exhibit G) requires subcontractors to perform HSE pre-qualification of their lower-tiered subcontractors that meets the criteria specified in 5.2.2 at a minimum. CH2M HILL subcontractors shall perform HSE pre-qualification of their lower tier subcontractors and CH2M HILL reserves the right to audit their process and documentation. The RHSM may, through the SCA, require CH2M HILL prequalification of high-risk lower-tiered subcontractors or service providers. Field activities are considered high risk if the activity is covered by either a specific OSHA standard (e.g. excavation and trenching, heavy equipment operation, demolition, confined space entry, electrical installations, hazardous material handling) or a CH2M HILL SOP.

5.2.5 Executing Subcontracts and Service Agreements

The SCA is responsible for working with the LID, RHSM and REM so that CH2M HILL's subcontracts (and subcontractors' lower-tier subcontracts) describe responsibilities for HSE performance and meet the following objectives:

- Subcontracts include clear, consistent, and documented understanding of responsibilities for HSE performance.
- Subcontracts have no gaps between assigned responsibilities that could affect site safety and incident prevention.
- Subcontracts include indemnification of CH2M HILL third party personal injury or property damage resulting from acts or omissions of the subcontractor and lower-tier subcontractors, including HSE-related fines or liabilities.
- CH2M HILL is named as additional insured under subcontractors' commercial general, commercial automobile and excess or umbrella liability insurance policies. This may also include additional insured status to the subcontractor's pollution liability insurance.

CH2M HILL standard subcontracting forms provide the necessary language to define specific HSE responsibilities. However, the SCA must identify and communicate the relationships to the LID, RHSM and REM so that the appropriate forms are used. In addition, the SCA should work with the LID to identify subcontractor insurance requirements. The SC shall review subcontract agreements prior to conducting fieldwork and verify that project files available to our site personnel include copies of executed subcontract agreements.

A subcontracting HSE checklist is included in Attachment 5 for use in determining if all HSE subcontracting elements have been satisfied.

HSE provisions are provided in Exhibit G of the subcontract forms. The RHSM works with the SCA to identify project-specific or subcontract-specific modifications to Exhibit G that must be included in subcontracts.

5.3 Project Planning

HSE program elements applicable during project planning include review of:

- Training and medical records (as required by OSHA standards)
- CH2M HILL Project HSE plan
- Subcontractor site-specific HSE procedures or plans

The Notice of Award and Notice to Proceed are issued only after the subcontractor is prequalified and HSE submittals are accepted, as illustrated below.

Prequalification → RFP → Notice of Award → HSE Submittals → Notice to Proceed

5.3.1 Training and Medical Certifications

Subcontractors are responsible for maintaining their employee training and medical monitoring records. Documentation of required training records and medical qualifications should be kept by the subcontractor on-site and available for review by the SC if requested. Additionally, subcontractors performing certain high-risk services may be required to provide copies of training and medical-monitoring records. The PM (with appropriate support from the RHSM and SCA) shall obtain acceptable documentation prior to the subcontractor performing site work. Certifications shall be evaluated by the RHSM. The RHSM must accept subcontractor training and medical monitoring certifications prior to the initiation of site work. Implementation guidelines for subcontractor submittal of training and medical monitoring certifications are provided in Attachment 6.

5.3.2 CH2M HILL Project HSE Plan

All CH2M HILL projects with a field-work component are required to have a project-specific HSE plan, with a qualified and designated safety coordinator to implement the plan. Each plan contains safe work practices, mitigation measures, assessment checklists, and necessary forms and permits for each identified hazard and impact. The plan does not provide details on subcontracted tasks, which are the subcontractor's responsibility. The project HSE plan establishes the minimum HSE requirements for projects that the subcontractors must comply.

5.3.3 Subcontractor Site-Specific HSE Procedures & Plans

Subcontractors must submit site-specific HSE procedures and/or plans that describe employee work practices that are safe and in compliance with applicable requirements.

Subcontractor submittal of site-specific HSE procedures shall be specified in the Request for Proposal (RFP) and a condition of Notice to Proceed.

The RHSM will review subcontractor procedures to establish that they reflect industry standards, are site-specific, and are consistent with CH2M HILL project HSE plan. The RHSM may use the CH2M HILL Subcontractor Safety Procedure Criteria located in each CH2M HILL activity-based SOP to identify minimum acceptable requirements when reviewing the subcontractor HSE procedures. Deficiencies shall be communicated to the subcontractor for resolution through the SCA. Subcontractor HSE plans and procedures must be accepted by the RHSM prior to the initiation of site work. The SCA shall not issue a final "Notice to Proceed" until the RHSM/REM indicates the subcontractor procedures, training and medical monitoring records are accepted. The Subcontractor will be required to attend a pre-job or kick-off meeting to review the HSE requirements and performance expectations described in the contract, scope of work, and HSE plan(s).

CH2M HILL review of subcontractor HSE procedures does not shift HSE responsibility. The subcontractor remains responsible for technical adequacy and compliance with applicable regulatory requirements.

When other contractors are present at the job site, the RHSM should review the contractor HSE plan to identify activities that may expose CH2M HILL personnel to hazards. Such hazards must be identified in the CH2M HILL project-specific written plan, in addition to the safe work practices used to mitigate exposure to the hazards.

5.4 Project Execution

HSE program elements applicable during project execution include:

- Subcontractor field oversight
- Field correction of hazards or conditions
- Documentation

5.4.1 Subcontractor Field Oversight

Although subcontractors are responsible for their own HSE performance, CH2M HILL provides subcontractor HSE field oversight on the project to manage the risk and liability from third party claims that is inherent with the subcontractor's work. A CH2M HILL SC must be present at the project site, while subcontractors are performing their work to effectively manage these risks. The level of subcontractor oversight varies according to the level of risk presented by the project, generally increasing as the degree of risk associated with the subcontractor's work increases, and relative to the qualifications, experience, and performance history of the subcontractor. The PM (with appropriate support from the SC and RHSM) is ultimately responsible for providing the appropriate type and frequency of oversight for subcontractor HSE practices.

CH2M HILL also provides HSE field oversight for certain high risk service providers and lower- tier subcontractors. A field activity is generally considered high risk if it is covered by either a specific OSHA standards (e.g. excavation and trenching, heavy equipment operation, demolition, confined space entry, electrical installations, hazardous material handling) or a CH2M HILL SOP. The RHSM determines the level of HSE oversight required to be provided by CH2M HILL for high risk lower tiered subcontractors and/or service providers.

Project-specific HSE field oversight practices to be implemented by the SC are described in CH2M HILL's project HSE Plan. To assist subcontractor oversight, each CH2M HILL activity-based SOP includes an HSE Self-Assessment Checklist, also included in the project HSE plan.

The Subcontractor will be required to conduct routine HSE meetings and inspections consistent with their approved HSE plan. A tailgate meeting is required to review the HSE requirements for the planned work using the Job Hazard Analysis (JHA) or Activity Hazard Analysis, or a Pre-task Safety Briefing form. Subcontractors will conduct periodic inspections of workplace conditions as described in the HSE plan consistent with OSHA standards and/or, the degree of hazard and potential for injury.

Additional, more-stringent practices apply when CH2M HILL is contracted as the CM for the job site, and supplemental guidelines for this situation are provided in Attachment 2.

5.4.2 Field Correction of Hazards or Conditions

The appropriate response to hazards or non-compliant conditions identified on a project site varies depending upon contractual terms and site conditions. As described in the following sections, CH2M HILL's responsibilities for subcontractor hazards or non-compliant conditions differ from CH2M HILL's responsibilities for other contractors or third parties.

The PM (with appropriate support from the SC, field team leaders, SM, site superintendents, or other field staff) is responsible for implementing the appropriate response to hazards or non-compliant conditions on a project site. The appropriate response is dependent upon the responsibilities assigned to CH2M HILL in the client contract, the nature of the work CH2M HILL has assigned to subcontractors in their subcontracts, and the responsibilities assigned to any third parties present on the job site. It is essential that the CH2M HILL response is consistent with contractually assigned responsibilities, or CH2M HILL risks assuming liabilities that are not consistent with the protections afforded by the contract, insurance, project procedures, staffing, and other aspects of CH2M HILL's HSE management process.

5.4.2.1 CH2M HILL Employees

CH2M HILL employees in a hazardous or noncompliant situation shall be immediately corrected. CH2M HILL employees shall leave an area that presents a hazard or danger and shall immediately report it to the PM or SC.

5.4.2.2 Subcontractors

The following are appropriate CH2M HILL responses for hazards or non-compliant conditions exhibited by subcontractors:

- When apparent non-compliance or unsafe conditions or practices are observed, notify the subcontractor's supervisor/safety representative verbally, document using the Observed Hazard Form (Attachment 7) and require corrective action. If necessary stop subcontractor's work using the Stop Work Order Form (Attachment 8) until corrective actions are implemented for observed serious hazards or conditions. Update the Observed Hazard Form to document corrective actions have been taken. The subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When an apparent imminent danger is observed, immediately stop work and alert all affected individuals. Remove all affected CH2M HILL employees and subcontractor

staff from the danger, notify the subcontractor's supervisory/safety representative, and do not allow work to resume until adequate corrective measures are implemented. Notify the PM, SCA and RHSM, as appropriate.

- When repeated non-compliance or unsafe conditions are observed, notify the subcontractor's supervisory/safety representative and stop affected work by completing and delivering the Stop Work Order Form (Attachment 8) until adequate corrective measures are implemented. Consult the SCA to determine what the contract dictates for actions to pursue in event of subcontractor non-compliance i.e., work stoppage, back charges, progress payments, removal of subcontractor manager, monetary penalties, termination of subcontractor for cause.

In all cases, CH2M HILL has the authority, as specified in the contract, and the responsibility to stop work in the event any CH2M HILL employee observes unsafe conditions or failure of the subcontractor to adhere to its safe-work practices. This authority and action does not in any way relieve the subcontractor of its responsibilities for the means and methods of the work or, therefore, of any corrective actions. Failure to comply with safe work practices can be the basis for restriction or removal of the subcontractor staff from the job site, termination of the subcontract, restriction from future work, or all three.

5.4.2.3 Other Contractors and Third Parties

In most contracting situations, other contractors, suppliers and third parties working at the client's site are solely responsible for the safety of their own workers and subcontractors. In these situations, CH2M HILL's HSE interaction with these third parties is limited to coordination and a review of their written safety program to determine if there are any potential impacts on CH2M HILL's plans and actions.

The following are appropriate CH2M HILL responses for hazards or non-compliant conditions exhibited by other contractors or third parties on a project site:

- If unsafe conditions or practices are observed by any CH2M HILL employee at an area controlled by a third party, inform the third-party's safety representative and our client. CH2M HILL's obligation is strictly limited to informing the third party and our client of our observation. The third party is solely responsible for determining and implementing necessary controls and corrective actions.
- If unsafe conditions or practices at an area controlled by a third party pose a risk to CH2M HILL employees or subcontractors, implement the following:
 - Notify the third-party's supervisor/safety representative
 - Ask the third party to determine and implement corrective actions
 - If needed, stop affected CH2M HILL work until the third party implements necessary controls and corrective actions. Notify the client, project manager, and RHSM, as appropriate
- If an apparent imminent danger is observed, immediately warn the third-party's employee(s) in danger, remove CH2M HILL staff and subcontractors from the vicinity, and notify the third-party's safety representative and the client. CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s), protecting our staff and subcontractors, and informing the third party and the client of our observation.

Additional considerations apply when CH2M HILL is providing third-party CM on a multi-contractor job site and there is no GC with contractual authority over the contractors.

5.4.3 Documentation

All oversight activities, corrective actions, observations, and communications must be documented using appropriate forms in Attachments and maintained in project and SCA files. Failure to document our subcontractor oversight (including efforts to require subcontractor adherence to their safety procedures) and third-party communications could reallocate HSE liabilities between the subcontractor(s), third parties, and CH2M HILL. As a general rule, “if it isn’t documented, it didn’t happen.”

Routine oversight activities, interactions, and observations can be adequately documented in clear, concise field log notes. However, any reviews of subcontractor or third-party operations, in particular any notice of deficiencies or unsafe conditions, must be formally documented in a letter or other written communication.

5.5 Subcontractor Performance Review

A Subcontractor HSE performance review will be conducted as part of the overall subcontractor performance evaluation process prior to close-out. The PM will lead the review with input from the SC, RHSM, and SM. The review will include a review of the subcontractor’s injury/illness experience, compliance with health and safety, and environmental regulations, regulatory agency inspections, generation and maintenance of applicable HSE documentation, implementation of their HSE program during project execution, and any notices of Field Correction or Stop Work Orders. The outcome of the subcontractor HSE performance review will be used to determine the subcontractor’s qualification status to be considered to bid on future CH2M HILL projects.

6.0 Training Requirements

CH2M HILL Project Managers must complete HSE Project Manager Training.

CH2M HILL Site Safety Coordinators must complete HSE SC Training.

Subcontractors are responsible for complying with all applicable HSE training requirements and for providing the training necessary to complete their tasks safely.

7.0 Recordkeeping

All CH2M HILL HSE documents must be retained and archived consistent with [HSE-119, Recordkeeping and Access to Records](#). The PM or designee will coordinate with the RHSM to ensure all applicable project records such as HSE Plans, training, medical, and exposure records are made available for storage and maintenance with the project files in accordance with the CH2M HILL records retention schedule.

8.0 Attachments

Attachment 1: [Contractual Relationships Illustration](#)

Attachment 2: [HSE Construction Management Practices](#)

Attachment 3: [Subcontractor Health, Safety and Environmental Performance Questionnaire](#)

Attachment 4: [Subcontractor HSE Prequalification Exception to Standard Evaluation Criteria](#)

Attachment 5: [Subcontracting Checklist](#)


Attachment 6: [Subcontracting Implementation Matrix](#)

Attachment 7: [Observed Hazard Form](#)

Attachment 8: [Stop Work Order Form](#)

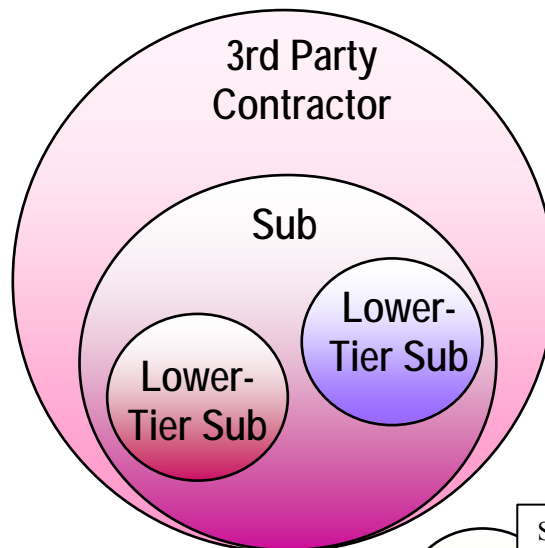
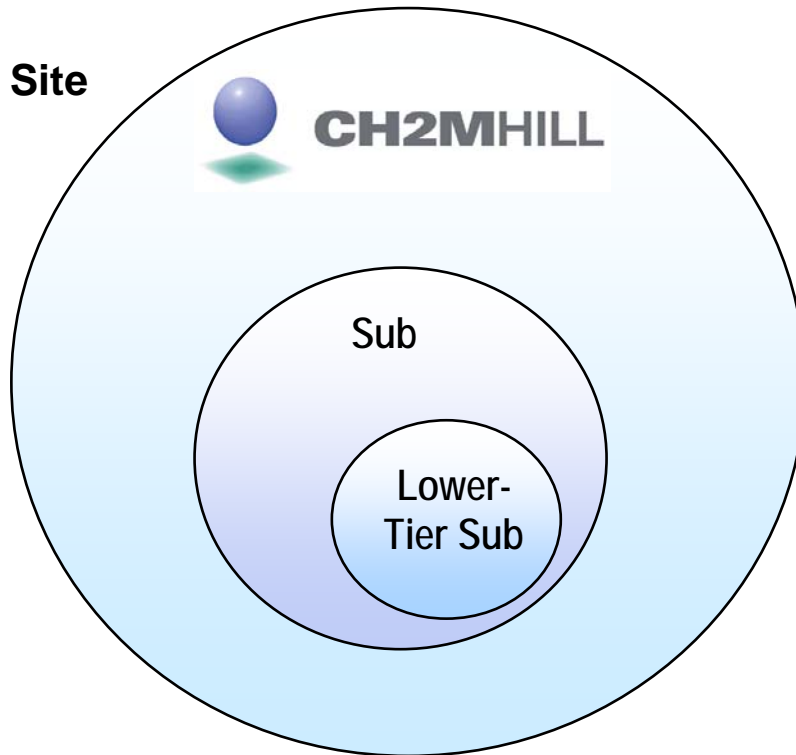
9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By:
1.0	10/10/2007		Jim Kelly	<i>R. Keith Christoph</i>
2.0	02/13/2008		Angelo Liberatore	<i>R. Keith Christoph</i>
3.0	12/29/2008	<p>Clarification for course of action for subcontractors who do not meet requirements for transport or disposal. Clarification in section 5.3.3 for pre-job meeting with subcontractor. Clarification in section 5.4.1 for subcontractor requirement for meetings and inspections. Added section 5.5, Subcontractor Performance Review.</p> <p>Attachment 3 – Subcontractor Questionnaire; Removed requirement to provide SIC; Question 2 removed 200 log, changed Lost-Day Incident rate to DART; Added question (8) on whether subcontractor has experienced a fatality in last 3 years; Added Energized Electrical and Traffic Control training to question 13.</p>	Jeff Stumpf	<i>R. Keith Christoph</i>
4.0	06/12/2012	<p>Update content consistent with current procurement organization, process, forms and tools. Attachment 3, Subcontractor Safety and Environment Performance Questionnaire aligns with CH-P05-0302-F1.</p> <p>Added responsibilities for the BG Operations Lead</p> <p>Updated Risk Review process that replaced ORE and ROMT to Program/Project Fact Sheet and Risk Register respectively in</p>	<p>Alan Anderson</p> <p>Angelo Liberatore</p> <p>Jim Kelly</p>	<i>Bridley C. Barker</i>

Revision	Date	Description	Prepared By	Approved By:
		<p>Proposal Manager and BG HSE Lead responsibilities</p> <p>Revised Section 5.2.2 Pre-qualification of Subcontractors.</p> <p>Added Section 5.2.3 Exceptions to Standard Prequalification Criteria for project exception</p> <p>Revised Subcontractor Health, Safety and Environment Performance Questionnaire to include project exception/deviation approval by the RHSM, REM, and the BG Operations Lead</p> <p>Added Attachment 4, Subcontractor HSE Prequalification Exception to Standard Evaluation Criteria form for optional use by BG</p>		

Attachment 1: Illustration of Contractual Relationships and Responsibilities

Client's Project Site





Contracts and Subcontracts

Standard Operating Procedure HSE-215

Attachment 2: Construction Management HSE Practices

1.0 Introduction

The role of Construction Manager can vary over a wide range of responsibilities for the construction process, from traditional “Services During Construction” to “3rd Party CM”, and the much greater role of “CM at Risk.” These different roles carry with them the potential for different levels of responsibility for safety on the construction site.

There are several ways our prime contract can result in responsibility for the safety performance of 3rd Parties at a construction site:

1. Our prime contract contains provisions wherein we expressly accept responsibility for safety, or responsibilities to review, approve, monitor, and enforce subcontractor and/or third party contractor safety programs.
2. Our prime contract assigns us authority to supervise and control the work. This can include the authority to stop work if there are safety violations, or provisions giving us substantial supervisory authority over the construction work, such as directing subcontractors or third party contractors on how the work should proceed, or controlling the scheduling and sequencing of the contractors work.
3. Our prime contract assigns us authority to direct the means and methods of the work, since means and methods can affect the safety elements of the work.

The law regarding assignment of safety responsibilities on multi-employer job-sites safety is based on a framework of employer categories which are a function of control and authority over the work, the hazards and the workers. In the event that a prime contract assigns sufficient controlling responsibility to the CM, the CM may be deemed responsible for safety as a matter of law. The language in CH2M HILL’s prime contract with the client could inadvertently make CH2M HILL liable for the safety of our subcontractors depending on content of language where the standard terms and conditions language are modified. A key consideration in determining control is the degree to which the CM has direct independent authority over 3rd Parties, versus acting as the Owner’s agent with the Owner taking/authorizing direct action on measures affecting safety or enforcing compliance with the contract requirements. If actions can only occur through the Owner, the CM is generally not considered a controlling employer. Merely inspecting, monitoring and reporting on Contractor’s compliance with the contract requirements, including their safety requirements, does not establish control. The law and its interpretation can vary from state to state.

Our site practices as CM can also impose responsibilities for construction site safety, even if our contract does not. This is consistent with the legal principle that a party can alter its contractual rights and obligations by its own actions. For example, if our CM staff are actually doing what is described in 1-3 above (e.g. review and approve safety plans, or

direct the means and methods of the work), then we may have effectively assumed responsibility for the safety of 3rd parties.

Use the following factors from the OSHA Multi-Employer Citation Policy to help determine if CH2M HILL may be considered a controlling employer on a CM project:

- Responsibility to review and approve health and safety plans of contractors and monitor the implementation of these plans; and/or coordinate contractor safety plans for an overall site safety plan;
- Authority to require correction of health and safety violations;
- Authority to stop work until violations of the contract or problems on the project are resolved;
- Authority to supervise the work-site and to take actions against contractors for failing to perform to their contract requirements.
- Authority to control or give directions to contractors on the means, methods, techniques or sequences of the work;
- Broad authorities over the entire project, including authority to resolve disputes among contractors, issue contract change orders, set schedules among contractors, and determine construction sequencing of the work. This broad authority can establish control even if the contract says that the CM does not have safety authority.
- CM acting in a manner to control or supervise the work of enforces safety, even if it in fact does not have the contractual authority to do so.

A determination of CM control is also more likely on projects where there is no designated General Contractor, but only a group of Contractors coordinated by the CM. There are differences in the way that individual states and local jurisdictions interpret these issues, and you should consult with your Health and Safety Manager and Corporate Legal when evaluating CM opportunities. We may find that while the owner is not asking the CM to be responsible for safety, the CM role has been scoped in a manner that represents control in the eyes of the law. In such cases, our objective is to guide the client in one direction or other, remembering that we will only accept non-traditional CM roles from clients who meet the criteria delineated in the Health and Safety Consulting Services Policy 312.

2.0 CH2M HILL Policy

It is CH2M HILL's policy to accept CM roles that fall clearly into either of the following two categories:

1. CH2M HILL has no responsibility for the safety of 3rd parties as a matter of law, contract and practice (i.e., the traditional CM role).
2. CH2M HILL has full responsibility for and authority over the safety of 3rd parties as a matter of contract and practice (i.e., the non-traditional role).

CH2M HILL's acceptance of non-traditional CM roles is subject to the criteria and guidelines delineated in the Health and Safety Consulting Services Business Procedures ([policies and procedures link on the HSE VO homepage](#)), and the additional criteria described in Section 4.0 of this Appendix. Special care, as discussed in Section 4.0 of this Appendix, is necessary to so that CM roles fall into one or the other of these two categories, and not in between.

3.0 Definitions

3.1 CM Services

Construction management is a specific category of services during construction (SDC) that are distinguished from engineering SDC by their higher level of interaction with the owner's contractor(s) and potential influence over the contractor's delivery of construction work, as opposed to focusing only on performance outcomes such as conformance to design specifications. Construction management (CM), by definition, involves construction performed by the owner's contractor(s), and our services can range, as a function of contract, from as little as contractor(s) coordination and information management for the owner, to as much as the complete planning, scheduling, and direct control of site operations. Third party CM involves providing CM services on projects where CH2M HILL did not provide the original design services. CM, at the upper end of its range, can approach the functionality and HSE responsibilities of a general contractor (GC), but without the direct contractual relationships and associated control over construction contractors and, as such, can represent a greater risk to CH2M HILL than GC services.

3.1.1 CM Services – Traditional Role

Within the practice of CM there is a “traditional role” where the CM is not assigned by law or contract, nor do they assume through job-site practices, responsibility for safety on the job-site for other than their own employees and subcontractors. In this traditional role, the CM coordinates and facilitates operations without directing or controlling construction operations in a manner that influences or impacts job-site safety.

3.1.2 CM Services – Non-Traditional Role

Within the practice of CM there is a growing “non-traditional role” where the CM accepts contractual responsibilities for safety on the job-site beyond their own employees. This is also referred to as CM at risk. In the non-traditional role, the CM accepts responsibility and authority over the safety of 3rd parties (e.g., construction contractors). Consistent with this “virtual general contractor” responsibility undertaken by the CM, the CM's and 3rd Party's contracts with the owner reflect the necessary insurance coverages, indemnities, operating authorities and protocols, and compensations.

4.0 CM Practices

Traditional CM services do not differ from HSE practices described in HSE-215. When we do not want to accept a non-traditional CM role, our objective is to steer the scope toward acting as the Owner's agent, with formal decision making and direction retained by the owner. Recommend alternative approaches for addressing job-site safety, including the client's hiring of an independent H&S Manager for the project to whom all parties, including CH2M HILL, would report on matters of safety. We can also assist the client in their development and implementation of a job-site safety program.

4.1 Non-Traditional CM HSE Practices

The sections that follow describe the criteria, guidelines and practices that implement CH2M HILL's policies associated with “Non-Traditional CM” services the pursuit and acquisition, planning, and execution of project delivery.

4.1.1 Project Pursuit and Proposal

When pursuing a non-traditional CM role, we must work with the client to make that role complete. This entails establishing the appropriate responsibilities, authorities, indemnities, insurance coverages, and operating practices in our contract and the third party's contract with the owner. It should also encompass evaluating historical safety performance during the selection of construction contractors. We must also receive sufficient scope and fee to adequately staff and manage job-site safety.

4.1.2 Contracts Administration

4.1.2.1 Executing the Prime Contract with the Client

A contract for non-traditional CM services must expressly describe roles and responsibilities for HSE, describing CH2M HILL's authorities, including stop work and authority to bar contractor staff from the work site on the basis of unsafe work practices. Our prime contract should also state the Contractor(s) is solely responsible for the safety of their workers and subcontractors. CH2M HILL's assigned responsibilities, authorities and actions do not in any way relieve the contractor(s) of its responsibility. Our prime contract shall also state that any and all third party contracts entered into by the client shall include the provisions listed below.

4.1.2.2 Third Party Contracts

Non-traditional CM projects will implement the equivalent of CH2M HILL's subcontractor management processes.

Work with the client to include safety performance records as an element of the 3rd Party selection process.

Strongly urge the client to involve CH2M HILL in the establishment and/or amendment of 3rd Party contracts that expressly describe roles and responsibilities for HSE, stating that 3rd Parties are held solely responsible for the safety of their workers and subcontractors, and the adequacy of their actions in complying with applicable regulations. The 3rd Partys' contracts must require them to implement effective accident prevention programs that include enforcement and corrective actions, and clearly state CH2M HILL's assigned responsibilities and actions do not in any way relieve the 3rd Party of their responsibility.

The 3rd Party contracts should describe CH2M HILL authorities, including stop work and authority to bar 3rd Party staff from the work site on the basis of unsafe work practices. Third Parties must also include CH2M HILL in their indemnification of the Owner for their negligence or the negligence of their subcontractors, including fines or liabilities arising from violations of applicable HSE laws or regulations. Third Parties must also name CH2M HILL as additional insured on their insurance.

Lastly the 3rd Party's contracts must specify requirements for submittal of HSE documents to CH2M HILL prior to work, implementation of safe work practices, and reporting of HSE information to CH2M HILL.

4.1.3 Planning the Work

When acting in a non-traditional CM role, CH2M HILL will develop and implement a basic Site-Wide Health and Safety Plan. The plan will be general and not scope-specific in nature, and based on applicable regulations, standard industry practices and CH2M HILL's

policies. The plan will expressly reiterate the 3rd Party's sole responsibility for the safety of their employees and subcontractors, the safe work practices associated with their scope, and their responsibility for enforcement. The plan will describe the responsibilities and authorities of CH2M HILL. CH2M HILL's assigned responsibilities, authorities and actions do not in any way relieve the 3rd Party of their responsibility.

3rd Parties will submit plans, procedures and training/medical records, and certificates of insurance to CH2M HILL for review and acceptance as a prerequisite to entering the site and performing work. CH2M HILL will communicate deficiencies directly to the 3rd Party who will be responsible for development of corrective actions.

4.1.4 Execution and Managing Change

When acting in a non-traditional CM role, CH2M HILL will staff the project with individuals who are qualified to perform a reasonable level oversight of the 3rd Party's operations to prevent and detect safety violations. The standard of reasonable oversight depends upon the following factors:

1. Physical scale of project
2. Nature, pace and complexity of the work, including the frequency with which number and types of hazards changes
3. Our familiarity with the 3rd Party's safety history and practices. If they have a history of non-compliance, or we have never worked with them before, the level of oversight would be higher. If we see evidence of strong safety efforts and a high level of compliance, then the level of oversight would be lower.

CH2M HILL will perform periodic in-depth audits of 3rd Party work. The frequency and depth to be consistent with the nature of work and risks.

CH2M HILL will conduct periodic safety briefings (e.g., weekly) with required 3rd Party attendance. CH2M HILL will require 3rd Parties to conduct their own periodic pre-work safety briefings (e.g., daily).

CH2M HILL will have the authority to stop work in the event they observe unsafe conditions or failure of the 3rd Party to comply with safe work practices, and require the contractor to develop and implement corrective actions.

CH2M HILL will directly inform the 3rd Party of any deficiencies and require them to develop and implement corrective action. CH2M HILL will have the authority to stop work pending 3rd Party's implementation of corrective actions, and will routinely inform client of the above.



Contracts and Subcontracts

Standard Operating Procedure HSE-215

Attachment 3: Subcontractor Health, Safety and Environment Performance
Questionnaire

SUBCONTRACTOR HEALTH, SAFETY AND ENVIRONMENT**PERFORMANCE QUESTIONNAIRE**

Proposed subcontractors shall complete this form and submit it to CH2M HILL

Subcontract Administrator (SCA) for review and approval by HSE. Proposed subcontractors shall be pre-qualified prior to executing a subcontract agreement with CH2M HILL. The information provided on this form will be reviewed as part of the selection criteria. Please provide the requested information as complete as possible to facilitate our review and evaluation.

Project Name: _____ **Project #:** _____

Project Manager: _____

Name of Subcontractor: _____

Address of Subcontractor: _____

Contact Name: _____

Phone Number: _____ Date: _____

North American Industry Classification System (NAICS) Code: _____

1. Has your company worked for CH2M HILL in the last 3 years? _____ Yes _____ No

If yes, what year and what project manager were you work for? Year: _____ Project Manager: _____

SAFETY

2. Use your OSHA 300 logs to record the number of injuries and illnesses for the last three years. Please note that CH2M HILL requires all subcontractors to provide incident statistics, even though certain companies may not be statutorily required to keep OSHA 300 logs.

YEAR

Current: _____

a. Number of Fatalities

b. Days Away/Restricted or Job Transfer (DART) Incident Rate(see #3 below)

c. OSHA Recordable Incident Rate(see#4 below)

d. Number of Hours Worked

e. Total Number of Employees on Your Payroll

f. **Attach a copy of your OSHA 300 logs for the last three years.**

3. The following formula is used for calculating the **Days Away/Restricted or Job Transfer (DART) Incident Rate:** =
$$\frac{\text{Number of DART Cases} \times 200,000}{\text{Number of Hours Worked}}$$

4. The following formula is used for calculating the **OSHA Recordable Incident Rate:** =
$$\frac{\text{Number of OSHA Recordable Cases} \times 200,000}{\text{Number of Hours Worked}}$$

5. List your company's Worker's Compensation (WC) Experience Modification Rate (**EMR**) for the three (3) most recent years:

Year	Interstate	Intrastate
a. _____	_____	_____
b. _____	_____	_____
c. _____	_____	_____

- d. **Provide a letter from your WC insurance carrier certifying the above EMRs.**
- e. **If your WC carrier has not issued your company an EMR because you have not accrued enough WC costs, provide a copy of your WC Loss Run (available from your WC carrier).**
- f. **If your current EMR is greater than 1.0, provide a written explanation of the safety methods implemented by your company to reduce this rate.**

6. List activities your company will be performing on CH2M HILL projects and the anticipated hazardous work operations (for example: excavation work, fall protection, ladders, scaffolding, confined space work, heavy equipment etc.)

Activities:

- a. Will you subcontract work to other subcontractors? Yes ___ No ___

If yes, **please detail what portion of work:** _____

- b. Do you prequalify subcontractors? Yes ___ No ___ **If yes, please attach method used to qualify subcontractors.**

7. Has your company received an OSHA (or State OSHA) citation within the last three (3) years? Yes ___ No ___

If yes, copies of the citation(s) and provide the following information below:

- a. The number and type of violations? _____
- b. The penalties assessed by OSHA? _____
- c. Were the citations contested/vacated? _____
- d. What specific corrective actions were taken to prevent further penalties/injuries? _____
- _____

8. Has your company experienced a workplace fatality within the last three (3) years? Yes ___ No ___

If yes, copies provide the following information below:

- a. The number and type of fatalities? _____
- b. What penalties were assessed by OSHA? _____
- c. What specific corrective actions were taken to prevent further fatality? _____
- _____

9. Does your company have a written occupational safety and health program?

Yes ___ No ___

If yes, please provide a copy of your health & safety program.

10. Does your company conduct field safety inspections to determine compliance with applicable regulations and procedures?

a. Yes ___ No ___

If yes, please provide sample copy of inspection form.

- b. Who conducts these inspections? (Please provide position/title) _____

- c. How often are safety inspections conducted? _____

11. Does your company have the following on your staff or on retainer?

	No	Yes	How Many	Staff	Retainer	Please give certification number(s)
Occupational Physician	___	___	___	___	___	_____
Certified Industrial Hygienist	___	___	___	___	___	_____
Certified Safety Professional	___	___	___	___	___	_____
Certified Health Physicist	___	___	___	___	___	_____

12. Does your company have an orientation program for new hires?

Yes ___ No ___

If yes, please provide an outline of the orientation and the topics covered

13. Has your company implemented any of the following training programs? **If yes, provide last date training was provided.**

Documented training records may be required prior to start of work or at the discretion of CH2M HILL.

Yes	No	Date		Yes	No	Date	
___	___	_____	Asbestos	___	___	_____	Hazardous Waste (40-hour and annual Refresher))
___	___	_____	Blasting/Explosives	___	___	_____	Hearing Conservation
___	___	_____	Bloodborne Pathogens	___	___	_____	Heavy Equipment operation
___	___	_____	Confined Space Entry	___	___	_____	Laboratory Safety
___	___	_____	Construction (OSHA Certified 10 Hours)	___	___	_____	Ladder/Scaffolding
___	___	_____	Construction (OSHA Certified 30 Hours)	___	___	_____	Lead
___	___	_____	Cranes Operations	___	___	_____	Lockout/Tagout
___	___	_____	Electrical Safety	___	___	_____	Personal Protective Equipment
___	___	_____	Energized Electrical Safety (NFPA 70E)	___	___	_____	Powder-actuated Tools
___	___	_____	Excavation Competent Person	___	___	_____	Process Safety Management
___	___	_____	Fall Protection	___	___	_____	Radiation Protection
___	___	_____	Fire Extinguishers	___	___	_____	Respiratory Protection
___	___	_____	First Aid/CPR/AED	___	___	_____	Traffic Control
___	___	_____	Forklift Operations	___	___	_____	Welding/Cutting

Who conducts training for your company (name, title)? _____

14. Does your company have a program in place to discipline workers that perform unsafe work practices? **If yes, please provide as attachment.** Yes ___ No ___

15. Does your company have written Accident Investigation Procedures? **If yes, please provide as attachment** Yes ___ No ___

16. Does your company currently maintain a program in compliance with applicable state “Right to Know” laws and the OSHA Hazard Communication Standard? Yes ___ No ___ **If yes, please provide as attachment**

17. Does your company currently maintain an Accident Prevention Program in compliance with applicable state OSHA regulations? (Required for Alaska, California, Minnesota, Nevada and North Carolina) Yes ___ No ___ N/A ___ **If yes, please provide as attachment**

18. Does your company implement a medical surveillance program for employees that work on hazardous waste sites or with hazardous chemicals (i.e., lead, asbestos, benzene, arsenic, formaldehyde, etc.)? Yes ___ No ___ N/A ___ **If yes, please provide as attachment**

19. Does your company hold “tailgate/toolbox” safety meetings? Yes ___ No ___
If yes, how often? _____ **If yes, please provide sample copy(s)**

20. Does your company have a written Alcohol and Substance Abuse Program? Yes ___ No ___
If yes, does it include the following?

a. 5-panel substance testing?	Yes ___	No ___
b. Pre-employment/pre-job assignment testing (within 30 days of pre-job assignment)?	Yes ___	No ___
c. Post-accident drug and alcohol testing?	Yes ___	No ___
d. Random testing (5 percent per month)?	Yes ___	No ___
e. Reasonable suspicion drug and alcohol testing?	Yes ___	No ___

If yes, please provide program as attachment.

ENVIRONMENT

21. Does your company have a written environmental program? If yes, please provide a copy. Yes ___ No ___

22. Does your company implement an Environmental Management System? Yes ___ No ___

23. Has your company received an EPA, country, state/province or local environmental requirements violation in the last 5 years? If yes, provide:	Yes ____	No ____
a. Number and type of violation(s): _____ b. Penalties/amounts: _____ c. Corrective actions: _____		
24. Has your company reported any spills in the last 3 years? If yes, please provide information:	Yes ____	No ____
25. If your company will be transporting hazardous materials or waste, please provide the following: a. Transport Method: <input type="checkbox"/> Air <input type="checkbox"/> Highway <input type="checkbox"/> Rail <input type="checkbox"/> Vessel b. Transporter ID No(s): (US EPA or other country equivalent) _____ c. Motor Carrier Nos.: (US DOT or other country equivalent) _____ State/Province _____		
26. If your company will be disposing of hazardous waste, please provide the following: a. Facility Name and Address: _____ b. Services (e.g., hazardous waste, asbestos, PCBs, recycling) _____ c. Attach proof (e.g., copy of front page) of all Country, State/Province, or local permits or licenses. d. Is the facility approved under the CERCLA Off-Site Rule (US companies only)? <input type="checkbox"/> Yes <input type="checkbox"/> No		
CERTIFICATION		
The undersigned warrants and represents the data provided in this document is accurate in all respects. <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> Name of Firm: _____ Completed by: _____ Signature: _____ Title: _____ Date: _____ </div> <div style="width: 65%;"></div> </div>		
CH2M HILL USE ONLY		
SCA Review Reviewed by: _____ Date: _____ All required data present prior to sending to HSE: Yes ____ No ____ If no, please gather data from subcontractor prior to sending the HSE for approval. Responsible Health and Safety Manager Review Reviewed by: _____ Date: _____ <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> Accepted <input type="checkbox"/> Project specific Exception/Deviation Approved* <input type="checkbox"/> Rejected </div>		

Responsible Environmental Manager Review (when reviewed by REM)

Reviewed by: _____ Date: _____

☐ Accepted ☐ Project specific Exception/Deviation Approved* ☐ Rejected

BG Operations Lead (for criteria exceptions only)

Reviewed by: _____ Date: _____

☐ Accepted ☐ Project specific Exception/Deviation Approved* ☐ Rejected

Additional level of planning and operational oversight required or other risk mitigation measures::

Revised 06-01-12

*A Corrective Action/ Risk Mitigation Plan is required if standard criteria is not met



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Attachment 4: Subcontractor HSE Prequalification Exception to Standard Evaluation
Criteria

Subcontractor HSE Prequalification Exception to Standard Evaluation Criteria

The potential subcontractor listed below does not meet one or more standard HSE prequalification criteria. The determination of whether to grant an exception to the standard criteria is summarized below. **Any approval/exception granted is applicable only to the specific project, scope of work and risk mitigation measures listed.**

Subcontractor Name:

Project and Location:

Client Name:

Project Number:

Scope of Work:

Why is this Subcontractor needed vs. a Subcontractor that meets standard HSE criteria?

Subcontractor Does Not Meet the Following Standard HSE Prequalification Criteria (list all):

Risk Mitigation Measures (may include increased safety staffing, additional oversight, project auditing, specific training, etc):

Recommendations

Project Manager: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Reason(s) for Recommendation:
HSE Reviewer: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Reason(s) for Recommendation:
Environmental Manager: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Reason(s) for Recommendation:

Approvals

BG HSE Director or Designee: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Comments:
Operations Management Approval: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Comments:
Construction Manager Approval: Name: _____ Date: _____ <input type="checkbox"/> Approve <input type="checkbox"/> Disapprove <input type="checkbox"/> N/A	Comments:



Contracts and Subcontracts

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Attachment 5: Subcontracting Checklist

Subcontracting Checklist

	Yes	No	N/A	Delegated To	Approved	Comments	Initials
Bid Package							
Insurance limits							
Bonding requirements							
Scope of work							
Training responsibilities/requirements							
Project HSE Plan							
Work plan submittal requirements							
HSE Questionnaire							
Drug-free program (CCI/contract required)							
Contractor license (if required)							
Subcontract Documents:							
H&S review/modify project-specific T&Cs							
Verify HSE roles/responsibilities defined							
Flow-downs included/incorporated							
Lower-tiered Subcontractors							
Acceptable documentation of flow-down							
Prior to Award							
HSE Questionnaire approved							
Prior to Notice to Proceed							
HSE procedures approved							
Acceptable Training Documentation							
Acceptable Medical Documentation							
Drug-free program submitted (CCI only)							
Pre-job meeting with Subcontractor							
During Execution							
Self-assessment completed per schedule							
Comply with HSE regulations							
Oversee SC if needed							



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Attachment 6: Subcontracting Implementation Matrix

HSE Site Management Implementation Matrix

Actions	Onsite Party			
	CH2M HILL	All Field Subcontractors	High-Risk ¹ Field Service Providers and High-Risk Lower-Tier Subcontractors	Client, Contractor or other 3 rd Party
Review HSE performance history	N/A	Yes	Yes ⁴	No
Provide CH2M HILL site HSE Plan ²	Yes	Yes	Yes	No
Review training, medical monitoring ³	Yes	Yes	Yes	No
Review HSE procedures	Yes	Yes	Yes	Only for our own understanding
Comment/require corrections to HSE procedures	Yes	Yes	Yes	Not unless authorized to direct, and only with approval
Provide Field Oversight (Monitor and enforce HSE)	Yes	Yes, level varies depending on prequalification info	Yes, level varies depending on prequalification info	Not unless authorized to direct, and only with approval
Immediately warn of danger	Yes	Yes	Yes	Yes
Notify of apparent non-compliance (supervisor, PM, and/or client)	Yes	Yes	Yes	Yes
Require safe conditions for CH2M HILL and our subcontractors	Yes	Yes	Yes	Yes
Require and assign corrective actions	Yes	Yes	Yes	Not unless authorized to direct, and only with approval
Direct H&S details	Yes	No	No	Not unless authorized to direct, and only with approval
Stop work (high-risk, repeat non-compliance)	Yes	Yes	Yes	Not unless authorized to direct, and only with approval
Document communications	Yes	Yes	Yes	Yes

¹High risk field activities involve multiple scope-dependent hazards, introduce additional hazards, or are delivered in an environment that is inherently hazardous (e.g., excavation with heavy equipment; demolition; on-site laboratories)

²Subcontractors are required to follow the general health and safety requirements in the CH2M HILL project safety plan. Subcontractors must also establish and follow their own procedures for operations or equipment that is not covered under the CH2M HILL general field safety plan. Generally, subcontractors are directly responsible for the same level of care to their lower tier subcontractors (e.g., our safety requirements flow down to our lower tier subs). Occasionally, we may need to assist in the review and enforcing of lower tier subs. This should be done only with RHSM concurrence and the appropriate level of RHSM involvement.

³Medical certifications are required for Hazwoper, lead, asbestos, respiratory protection and when required by OSHA chemical-specific regulations.

⁴ As determined by the RHSM.



Contracts and Subcontracts

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Attachment 7: Observed Hazard Form

OBSERVED HAZARD FORM

NAME/COMPANY OF OBSERVER (*OPTIONAL*):

DATE REPORTED: _____

TIME REPORTED: _____

CONTRACTOR/S PERFORMING UNSAFE ACT OR CREATING UNSAFE CONDITION:

1. _____

2. _____

3. _____

UNSAFE ACT OR CONDITION:

LOCATION OF UNSAFE ACT OR CONDITION:

NAME OF CH2M HILL REPRESENTATIVE:

CORRECTIVE ACTIONS TAKEN:

DATE: _____

PROJECT SAFETY COMMITTEE EVALUATION:

DATE: _____



Contracts and Subcontracts

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Attachment 8: Stop Work Order Form

Stop Work Order

A WORK STOPPAGE IS ISSUED FOR NONPERFORMANCE ISSUE(S) SPECIFIED BELOW AND SHALL REMAIN IN EFFECT UNTIL ALL CORRECTIVE ACTIONS ARE COMPLETED.

REPORT PREPARED BY:

Name:	Title:	Signature:	Date:

ISSUE OF NONPERFORMANCE

Description: _____ _____ _____ _____ _____ _____ _____	Date of Nonperformance: _____
---	---

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	Title:	Signature:	Date:

** Corrective action is to be taken immediately. Note below the action taken, sign and return to CH2M HILL.**

SUBCONTRACTOR'S CORRECTIVE ACTION

Description: _____ _____ _____ _____ _____ _____ _____	Date of Corrective Actions: _____
---	---

SUBCONTRACTOR SIGNATURE OF CORRECTION:

Name:	Title:	Signature:	Date:

Traffic Control

Enterprise Standard Operating Procedure HSE-216

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups must comply, when personnel who are potentially exposed to hazards associated with vehicle traffic and traffic control operations.

2.0 Scope and Application

2.1 Scope

This SOP provides information regarding the associated hazards and issues to be addressed during phases of a project involving exposure to vehicle traffic and traffic control.

Traffic and traffic control topics covered by this SOP include, but are not limited to, working adjacent to or in active roadways (day/night); traffic control zones; traffic control device installation and removal; flagging; inspection and maintenance of traffic control devices and equipment; and general roadway traffic control zone safety.

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental and Occupational Safety and Health (OSHA) programs may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (RHSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by vehicle traffic and traffic control operations, regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);
- CH2M HILL provides oversight of subcontractor's traffic control operations; and/or
- CH2M HILL self-performs traffic control operations.

2.3 Applicable Enterprise SOPs

None

3.0 Definitions

None

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the Site Manager (SM), or is designated by the SM to implement the project HSE Plan and who has successfully completed all required SC training. The SC trains CH2M HILL employees exposed to the hazards posed by vehicular traffic and traffic control operations, in hazard awareness and control procedures, as detailed in the site-specific health and safety plan. The SC also oversees subcontractor's traffic control operations.

4.2 Responsible Health and Safety Manager (RHSM)

The RHSM is the HSM assigned by the BG H&S Lead to provide health and safety technical guidance and support to the project. Provide additional information regarding more stringent state-OSHA and Department of Transportation plans/requirements that apply to the project.

5.0 Requirements

The following requirements outlined in this Enterprise SOP must be implemented.

5.1 Safe Work Practices

These safe work practices are to be followed by CH2M HILL employees who are exposed to the hazards posed by vehicular traffic and traffic control operations, regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

- All personnel working on or adjacent to active roadways or within traffic control zones must wear reflective/high-visibility safety vests.
 - This applies to all work activities regardless of duration (e.g., survey crews, traffic engineering studies, site walk-through, emergencies, and other short duration operations).
 - The type and style of high visibility safety vests and/or clothing selected to be worn will be determined by traffic conditions (speed of vehicle travel), time of day and amount of light, and climatic conditions.
- A traffic control plan should be developed and implemented consistent with anticipated roadway, traffic, and work conditions.

- The traffic control plan should consider factors that influence traffic-related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.
- Work areas should be protected by a rigid barrier such as a K-rail or Jersey barrier, where feasible.
- Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers.
- Minimize the amount of time that you will have your back to oncoming traffic. When personnel must face away from traffic, a lookout shall be used.
- Vehicles should be parked at least 40 feet away from the work area and traffic.
- All vehicles within 40 feet of traffic shall have a roof-mounted hazard beacon/strobe in operation. Road flares may be deployed during short duration operations.
- Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC) or truck-mounted attenuator (TMA).
- Signs, barricades, channelizing devices, markings, and lighting devices shall conform to the standards of ANSI D6.1-1978, “Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI: Traffic Controls for Street and Highway Construction and Maintenance Operations.”
- Inspect traffic control devices continuously to ensure that they are adequate to protect the traffic control zone.
- Flagging should only be used when required to control traffic and when all other means of traffic control are inadequate to warn and direct drivers.
- Additional traffic control zone controls shall be considered including, but not limited to, limited working hours (e.g., avoidance of lane closures on Fridays, weekends, Mondays, or holidays), minimizing work starting and stopping during rush hour on weekdays, and restricting work during special events.
- Personnel shall not walk onto or across live, high-volume, or high-speed roadways (e.g., tollways, turnpikes, parkways, expressways, etc.).
- Cranes shall not swing loads or booms over live roadways. Where feasible, closings, temporary shutdowns, or slowdowns shall be performed

5.2 Regulatory and Industry Standards

Occupational Safety and Health Administration (OSHA) 29 CFR 1926 contains regulatory requirements for traffic control signs, signals, and barricades. These include 1926.201 through 203. Industry standards incorporated by reference are American National Standards Institute ANSI D6.1-1978, “Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI: Traffic Controls for Street and Highway Construction and Maintenance Operations.” Some state-OSHA and Department of Transportation plans may have more

stringent requirements. Contact the Responsible Health and Safety Manager for additional information.

The following subsections provide the minimum regulatory and industry standard requirements pertaining to traffic control operations. These requirements apply when CH2M HILL is overseeing subcontractor's traffic control operations and self-performing these operations.

5.2.1 Safety Equipment

The subcontractor is responsible for providing all personal protective equipment (PPE) necessary for its employees. CH2M HILL will only provide PPE for its own employees. Minimum personal protective equipment includes the following

- Safety-toed shoes or boots, hard hats, and safety glasses.
- Body protection (such as gloves, coveralls, or Tyvek) when chemical hazards exist.
- Hearing protection when working in close proximity to loud equipment and vehicle traffic.
- Reflective/high-visibility safety vests for personnel signaling or working on or adjacent to live roadways.
- Road flares, reflective triangles, and other temporary, high-visibility warning devices.
- Signs, barricades, channelizing devices, markings, and lighting devices that conform to the standards of ANSI D6.1-1978, "Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI: Traffic Controls for Street and Highway Construction and Maintenance Operations."
- Roof-mountable vehicle hazard beacons/strobes.

5.2.2 General Requirements

- A lane or shoulder closure is required when work is performed within 2 meters of, on, or above a live roadway.
- The decision to use a particular traffic control configuration at a particular location shall be made on the basis of an engineering study of the location.
- In lieu of an engineering study, traffic control devices shall be placed only with the approval of the authority or official having jurisdiction over the location.
- All traffic control devices used on street and highway construction or maintenance work shall conform to the applicable specifications of ANSI D6.1-1978, "Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI: Traffic Controls for Street and Highway Construction and Maintenance Operations."
- A traffic control plan, in detail appropriate to the complexity of the roadway and planned work activity, shall be prepared and understood by all responsible parties before the site is occupied.
- Special plan preparation and coordination with transit and other highway agencies, police and other emergency units, utilities, schools, railroads, etc., may be needed to receive input and support for advising motorists of the traffic operation situations.

- Traffic movement and flow shall be inhibited or disrupted as little as feasible.
- Supplemental equipment and work activities shall not interfere with traffic (for example, temporary light towers shall be placed and aimed so as not to create blinding conditions for approaching vehicles; dust and particle generation shall not migrate into traffic; cranes shall not swing loads over live roadways, etc.).
- Drivers (including bicyclists) and pedestrians shall be guided in a clear and positive manner while approaching and traversing traffic control zones.

5.2.3 Traffic Control Zones

- The temporary traffic control zone shall include the entire section of roadway between the first advance warning sign through the last traffic control device, where traffic returns to its normal path and conditions.
- Temporary traffic control zones can be divided into five areas: advance warning, transition, buffer space, work area, and termination. (See **Attachment 3 – Areas of Traffic Control Zones**)
- The advance warning area may vary from a single sign or flashing lights on a vehicle to a series of signs in advance of the temporary traffic control zone transition area.
- The use of speed, roadway condition, and related driver expectancy (visibility, etc.) must be considered in order to derive advanced warning area sign spacing distance.
- Warning sign spacing in advance of the transition area usually fall within the range of one-half mile to one mile for freeways or expressways, 1,500 feet for most other roadways or open highway conditions, and at least one block for urban streets.
- Transition area shall be used to channelize traffic from the normal highway lanes to the path required to move traffic around the work area.
- A buffer area shall be used to provide a margin of safety for both traffic and workers.
- The buffer area shall be free of equipment, workers, materials, and worker vehicles.
- The length, in feet, of the buffer area shall be two times the posted speed limit.
- The work area shall be that portion of the traffic control zone that contains the work activity and is closed to traffic and set aside for exclusive use by workers, equipment, and materials.
- A termination area shall be provided for traffic to clear the work area and return to normal traffic lanes.
- A downstream taper shall be placed in the termination area.

5.2.4 Device Installation and Removal

- All vehicles used to install and remove traffic control devices and those entering and exiting traffic control zones must be equipped with and use an approved roof-mounted hazard beacon/strobe.
- Traffic control devices shall be installed in the direction of traffic flow starting with the sign or device that is farthest from the work area and progressing as the work area is approached.

- Devices shall be removed in the opposite order of installation by starting with the device closest to the work area and continuing away from the area.
- Traffic shall be moved out of its normal path through the use of a taper.
- Tapers shall be created using a series of channelizing devices such as traffic cones, barrels, and pavement markings.
- The length of taper used to close a lane shall be determined by the speed of traffic and the width of the lane to be closed (the lateral distance that traffic is shifted). The formulas and their criteria for application are shown in Table 1.

TABLE 1: FORMULAS FOR TAPER LENGTH

<u>Posted Speed</u>	<u>Formula</u>
40 mph or less	$L = W \times S^2 / 60$
45 mph or over	$L = W \times S$
L = taper length S = posted speed, or off-peak 86 percentile speed W = width of lane or offset	

- Installation and removal of the taper is the most hazardous period of traffic control operations. Arrange for a local police or highway patrol presence, with flashing blue and red lights, at the commencement of taper installation and removal.
- The use of a truck-mounted crash cushion (TMCC) or truck-mounted attenuator (TMA) vehicle shall be used to protect personnel installing and removing traffic control devices.
- Cones may be placed by workers on foot or from a moving vehicle. When working from a vehicle, the truck shall be equipped with a suitable worker platform and railing.
- Cones must be 18-inch tall, except for high-speed, high-volume or nighttime operations when cones must be 28-inch tall and reflectorized.
- Temporary sign supports shall require ballast, such as sandbags, to prevent movement.
- Sequential arrow panel (flashing arrow boards) are required for all lane closures on multi-lane highways, except during emergencies.
- Concrete or semi-rigid barrier are recommended for stationary work areas with exposure to high-speed, high-volume traffic.
- Sand or water-filled plastic barrels, crash cushions, or energy absorbing terminals shall be used to protect traffic from hazards such as exposed barrier ends and bridge parapets.
- Changeable message signs (CMS) are recommended for high-speed, high-volume roadways, or work operations that require a high-visible message.
- The CMS should only be used to supplement or enhance work zone safety and not to replace required signage.
- No more than two message panels shall be used in any message cycle on CMS.

5.2.5 Flagging

- Flagging should be employed only when all other methods of traffic control are inadequate to warn, direct, or control traffic.
- Only persons who have successfully completed an approved flagging course and who possess current flagging certification can be used as flaggers.
- Except for unusual situations, locate the flagger off the traveled portion of the roadway.
- More than one flagger may be necessary to achieve traffic control in both directions, in which case a means of communication between flaggers must be considered.
- Hand signaling by flaggers shall be by use of red flags at least 18 square inches or sign paddles, and red lights in periods of darkness.
- Flaggers must be alert and close enough to warn the crew of erratic motorists, but must not be positioned among the work crew.
- Prior to each traffic control set up, the crew and flaggers must determine an “escape plan” to avoid an errant vehicle.
- All signs indicating the presence of a flagger are in place prior to commencing work activities.
- All signs indicating the presence of a flagger must be removed or covered when flagging is not actually being done, such as lunch hours or if work operation no longer requires flagging.

5.2.6 Inspection and Maintenance

- Temporary traffic control zones should be carefully monitored under varying conditions of traffic volume, light, and weather to ensure that traffic control measures are operating effectively and that all devices used are clearly visible, clean, and in good repair.
- Traffic control devices are to be inspected at the beginning of each work shift and periodically throughout the day.
- After a hazard-increasing event, such as a car contacting traffic control devices or high winds or storms, the traffic control devices shall be immediately restored to their proper position.
- Damaged traffic control devices or those in poor condition shall be removed from service and replaced immediately and before work commences or continues.
- Traffic control devices that use reflected light for illumination shall be cleaned and their effectiveness monitored continuously.

5.3 Subcontractor HSE Oversight

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HSE regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL’s oversight does not relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

The “Subcontractor Safety Procedure Criteria – Traffic Control” presented in Attachment 1 provides the minimum criteria for subcontractor safety procedures. These criteria may be used by the HSE staff to review submitted subcontractor procedures when CH2M HILL is performing oversight of subcontractor’s operations.

The subcontractor’s supervisor serves as the overall competent person for construction activities. When the subcontractor is in control of traffic control operations, the subcontractor shall provide certified personnel, including certified flaggers where applicable, and comply with those states that require certification of personnel designing, reviewing, or supervising installation and removal of traffic control devices.

5.4 CH2M HILL Self-Perform Requirements

When CH2M HILL is in control of traffic control operations, CH2M HILL shall provide certified personnel, including certified flaggers where applicable, and comply with those states that require certification of personnel designing, reviewing, or supervising installation and removal of traffic control devices.

6.0 Training Requirements

CH2M HILL employees, who are exposed to the hazards posed by vehicular traffic and traffic control operations, are required to be trained in hazard awareness and control procedures by the SC, as detailed in the site-specific health and safety plan. The SC must successfully complete all CH2M HILL required SC training.

CH2M HILL employees, who work on construction projects, are required to complete 10-Hour Construction Safety Awareness training course.

CH2M HILL employees who are exposed to the hazards posed by vehicular traffic and traffic control operations, are required to the Traffic Safety computer-based training module found on the HSE web page. This training does not qualify CH2M HILL employees perform traffic control operations, such as lane closures, or to act as flaggers; these activities require more advanced training.

CH2M HILL employees who perform traffic control operations shall be provided the training necessary to perform these operations safely. CH2M HILL employees may be required to complete additional specialized, provided by commercial training specialists.

Subcontractors are responsible for complying with all applicable HSE training regulations providing the training necessary to complete their tasks safely. Subcontractor training shall be verified prior to the start of field operations.

7.0 Forms, Permits and Checklists

The “HSE Self-Assessment Checklist – Traffic Control” in Attachment 2 may be used to verify subcontractor’s and CH2M HILL self-perform compliance with safety procedures, established practices, regulations, and industry standards. The RHSM specifies the frequency in which this checklist should be completed by the SC and provides this information in the project’s written safety plan. The RHSM may also use this checklist when performing HSE audits at CH2M HILL projects, including subcontractor’s activities.

8.0 References

American National Standards Institute ANSI D6.1-1978, "Manual on Uniform Traffic Control Devices for Streets and Highways, Part VI: Traffic Controls for Street and Highway Construction and Maintenance Operations."


9.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria-Traffic Control](#)

Attachment 2 [HSE Self Assessment Checklist-Traffic Control](#)

Attachment 3 [Areas in Traffic Control Zones](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	11/5/2007	<p>Revised existing CH2M HILL SOP to apply when: employees are exposed to the hazard; oversight of subcontractor operations and CH2M HILL self-perform operations.</p> <p>SOP requirements include safe work practices and regulatory and industry standards pertaining to traffic control operations.</p> <p>When CH2M HILL self performs traffic control operations</p> <p>Subcontractor Safety Procedures Criteria and HSE Self-Assessment Checklist are not mandatory, but are provided in the attachments as a tool to oversee subcontractor's operations and to assess CH2M HILL self perform compliance with the SOP.</p>	Angelo Liberatore	



Attachment 1: Subcontractor Safety Procedure Criteria-Traffic Control

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor traffic control procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Traffic Control Procedures:

1. Provide the name and qualifications (years and type of experience, training background, state certification, etc.) of the individual responsible for designing and supervising traffic control operations.
2. Provide the qualifications (years and type of experience, training background, etc.) of personnel working in traffic control zones as flaggers.
3. Provide a list of work areas and activities where traffic control will be required.
4. Provide an inventory (amount and type) of traffic control devices and equipment to be used for traffic control operations (truck-mounted crash cushion or attenuator vehicles, cone trucks, message boards, arrow boards, signage, channeling devices, barriers, etc.).
5. Provide a copy of the traffic control plan for the traffic control zones anticipated to be required for this project.
6. Provide a copy of an engineering study of the location for which the traffic control plan was developed.
7. Provide a description of traffic control device inspection criteria or procedures (frequency of inspections and items that are inspected).
8. Describe the arrangements to be made with local police or highway patrol to facilitate traffic control device installation and removal.



Attachment 2: HSE Self-Assessment Checklist-Traffic Control



HSE Self-Assessment Checklist—TRAFFIC CONTROL

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are exposed to traffic hazards and/or (2) CH2M HILL provides oversight of subcontractor personnel who are exposed to traffic hazards.

SC may consult with subcontractors when completing this checklist, but shall not direct the means and methods of traffic control operations nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposure to traffic hazards.
☐ Evaluate a CH2M HILL subcontractor's compliance with traffic control requirements.
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor.
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-216.

SECTION 1

Yes No N/A

N/O

SAFE WORK PRACTICES (5.1)

1. Personnel working on/adjacent to active roadways or in control zones are wearing safety vests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Traffic control plan (TCP) is consistent with roadway, traffic, and working conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. TCP has been approved by regulatory or contractual authority prior to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. TCP considers all factors that may influence traffic related hazards and controls.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Work areas are protected by rigid barriers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Lookouts are used when applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Vehicles are parked 40 feet away from work zone or are equipped with hazard beacon/strobe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. TMCC or TMA vehicle is used where appropriate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All CH2M HILL traffic control devices conform to MUTCD standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Traffic control devices are inspected continuously.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Flagging is only used when other means of traffic control are inadequate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Additional traffic control zone controls have been implemented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Cranes do not swing loads/booms over nor do workers enter/cross live roadways (as defined).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	SECTION 2	Yes	No	N/A
	N/O			
GENERAL (5.2.2)				
14. Lane closings are performed when required by this SOP.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Traffic control configurations are based on an engineering study of the location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. If no study, traffic control is performed with approval of the authority having jurisdiction.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. TCP has been prepared and understood by all responsible parties prior to work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Special preparation/coordination with external parties has been conducted where applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. All contractor traffic control devices conform to MUTCD standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Traffic movement and flow are inhibited or disrupted as little as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Supplemental equipment and activities do not interfere with traffic.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Drivers and pedestrians are considered when entering and traversing traffic control zone.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TRAFFIC CONTROL ZONES (5.2.3)				
23. Traffic control zones are divided into the necessary five areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Advances warning area is designed based on conditions of speed, roadways, and driver needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Advanced warning signage is spaced according to roadway type and conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Transition areas are used to channelize traffic around the work area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Buffer areas are used to provide a margin of safety for traffic and workers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. The buffer area is free of equipment, workers, materials, and worker vehicles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. The length of the buffer area is two times the posted speed limit in feet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. All work is contained in the work area and is closed to all traffic.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. A termination area is used to provide traffic to return to normal lanes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. A downstream taper is installed in the termination area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DEVICE INSTALLATION AND REMOVAL (5.2.4)				
33. All vehicles involved with device installation/removal have hazard beacons/strobes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Devices are installed according to the order established by this SOP.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Devices are removed in the opposite order of installation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Tapers are used to move traffic out of its normal path.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Tapers are created using channelizing devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. The length of taper is determined by posted speed and width of lane to be closed (see formula).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Local police or highway patrol assist during taper installation and removal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. TMCC/ TMA vehicles are used to protect personnel during installation and removal of devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Cone trucks are equipped with platforms and railings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Cones are the appropriate height for the specific roadway and are reflectorized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Temporary sign supports are secured using sandbags to prevent movement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Arrow panels are used on lane closures where required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Concrete barriers are used where required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Barrels, crash cushions, or energy absorbing terminals are used to protect traffic as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Changeable message signs (CMS) are used as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. CMS are not used to replace required signage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. No more than two message panels are used in any message cycle on CMS.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FLAGGING (5.2.5)				
50. Flagging is used only when other traffic control methods are inadequate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Only approved personnel with current certification are allowed to be used as flaggers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Flaggers are located off the traveled portion of the roadway.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. A communication system is established when more than one flagger is used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Hand signaling by flaggers is by means of red flags, sign paddles, or red lights.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Flaggers are alert, positioned close enough to warn work crews, and easily identified from crew.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. An escape plan is established by crew and flaggers prior to traffic control set up.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Signs indicating a flagger is present are used and removed as required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

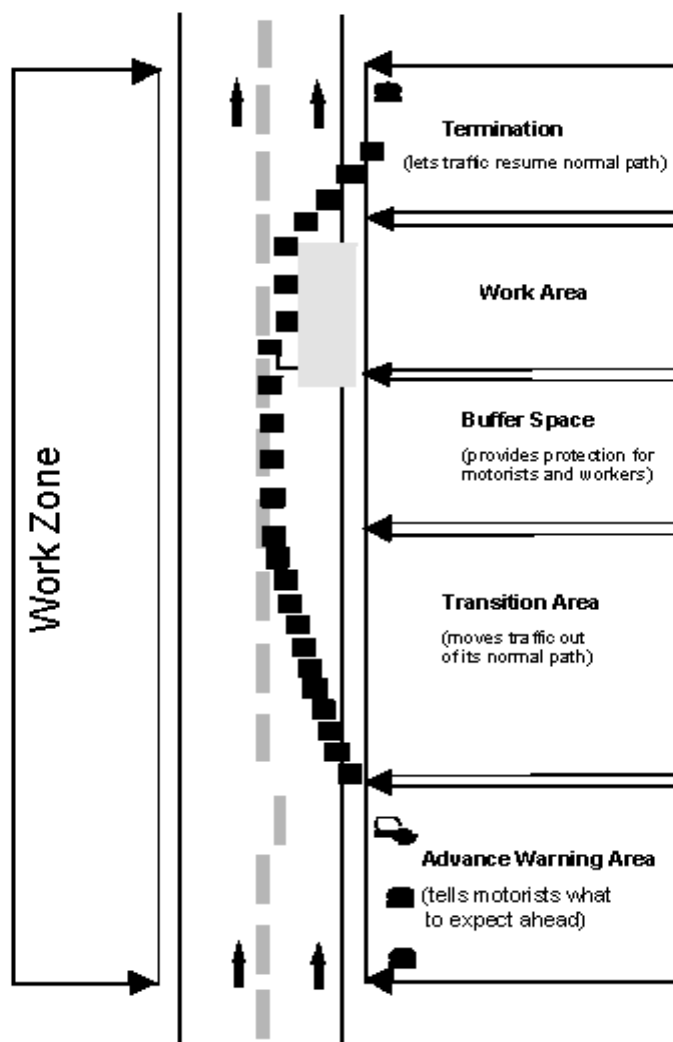
<u>SECTION 2</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>
<u>N/O</u>			
INSPECTION AND MAINTENANCE (5.2.6)			
58. Traffic control zones are monitored to determine their effectiveness under varying conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Traffic control devices are inspected at the beginning and continuously during work shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Traffic control devices are restored to their proper position immediately and continuously.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Damaged, old, or ineffective devices are removed and replace immediately and continuously.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Devices using reflected light for illumination are cleaned and monitored continuously.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

HSE-216 VERSION 1 – A2

Attachment 3: Areas in Traffic Control Zones

Areas of Traffic Control Zones



Hazardous Waste Operations

Enterprise Standard Operating Procedure HSE-218

1.0 Purpose

The purpose of the Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) is to control the spread of contamination, reduce the potential exposure to employees and the general public to site contaminants, and identify the requirements to implement if unanticipated contamination is encountered during work considered to be “clean.”

2.0 Scope and Application

2.1 Scope

This Enterprise HSE SOP describes the requirements for site control, decontamination, and unanticipated contamination that CH2M HILL Legal Entities and Business Groups (BGs) must comply with when performing site investigations or remedial actions regulated as hazardous waste sites.

2.2 Application

This SOP applies enterprise-wide to all CH2M HILL Legal Entities that operate in the United States (U.S.) and internationally when CH2M HILL employees are required to perform work during site investigations and remedial actions.

This Enterprise SOP applies when CH2M HILL employees are exposed to the hazards posed by environmental media or equipment contaminated with hazardous waste at project sites, regardless of the company responsible for the operations (CH2M HILL, subcontractors, or third-contractor).

Where state Occupational Safety and Health Administration (OSHA) agencies may have more stringent requirements, contact the appropriate Responsible Health and Safety Manager to address these specific requirements.

For international operations, this SOP is to be followed as a minimum requirement, unless country-specific health, safety, and environmental (HSE) regulations (i.e., Canada, Australia, or European Union countries) for hazardous waste operations are more stringent.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedure and SOPs applicable to this personal protective equipment (PPE) SOP are as follows:

- [HSE-106, *Emergency Planning*](#)
- [HSE-110, *Training*](#)

- [HSE-113, Medical Monitoring](#)
- [HSE-121, Respiratory Protection](#)
- [HSE-215, Contracts, Subcontracts, and HSE Management Practices](#)
- [HSE-220, Written Plans](#)

3.0 Definitions

3.1 Buddy System

The buddy system is a safety teamwork plan wherein two or more workers ensure they are in visual or auditory contact with each other during work activities to provide assistance if required.

3.2 Contamination Reduction Zone (CRZ)

A CRZ serves as a buffer zone between the contaminated and uncontaminated portions of the field site. Workers and materials departing the EZ are decontaminated in this CRZ before passing into the support zone.

3.3 Decontamination

Decontamination is the physical and chemical process of removing or neutralizing contaminants that may have accumulated on personnel and equipment.

3.4 Exclusion Zone (EZ)

The EZ is the area where contamination has been detected or is suspected to exist.

3.5 Hazardous Waste

A hazardous waste is any waste that is listed as, or meets the criteria for, a hazardous waste as defined by the U.S. EPA or the local jurisdiction having authority over hazardous waste regulations.

3.6 Hazardous Waste Operations

The following operations are included in the definition:

- Cleanup operations involving hazardous substances required by a governmental body (whether federal, state, territory, local, or other) and conducted at uncontrolled hazardous waste sites (including sites recognized by government agencies and initial investigations of government-identified sites conducted before the presence or absence of hazardous substances has been ascertained)
- Voluntary clean-up operations at sites recognized as uncontrolled hazardous waste sites by federal, state, territory, local or other governmental bodies
- Voluntary cleanup operations at sites recognized by CH2M HILL clients as uncontrolled hazardous waste sites in International Regions
- Operations involving hazardous waste conducted at treatment, storage, and disposal (TSD) facilities

3.7 Hazardous Waste Site (Site)

The Hazardous Waste Site is the area or location where hazardous waste operation activities take place. A site may be as small as the area around a groundwater monitoring well or as large as a major soil excavation remediation and treatment project. A site may comprise the entire client location or only a small, limited area where activities are actually being conducted.

3.8 Hazardous Substance

Refers to any substance that can be damaging to a person's health and wellbeing or may result in adverse effects on the health or safety of employees or the public.

3.9 Health and Safety Plan (HSP)

The HSP is the written safety program for hazardous waste operations

3.10 Hotline

The boundary of the EZ is called the hotline and marked with hazard tape, signs, placards, traffic cones, chains, or rope.

3.11 Regulated Activities

All cleanup operations at uncontrolled hazardous waste sites, unless the employer can demonstrate that the operation does not involve employee exposure to a hazardous substance or the reasonable possibility for employee exposure to health or safety hazards.

3.12 Support Zone (SZ)

The SZ is the area where the command post and support facilities are located. The SZ must be located in an uncontaminated area.

3.13 Uncontrolled Hazardous Waste Site

An uncontrolled hazardous waste site is a site where an accumulation of hazardous substances creates a threat to the health and safety of individuals, the environment, or both.

4.0 Roles and Responsibilities

The following subsections list the roles and responsibilities required to implement the hazardous waste operations program.

4.1 Project Manager (PM)

The PM has overall HSE management responsibility for implementing the requirements in this SOP and is responsible for the following:

- Ensuring site control measures are in place and described in project plans (e.g., HSP)
- Ensuring decontamination procedures are in place and described in project plans
- Notifying the client and project team of unanticipated contamination and analyzing the situation (with assistance from the RHSM) to determine the requirements for continuing work

- Notifying the contract administrator (KA) that contamination has been encountered so the KA can review the contracts and make necessary adjustments.

4.2 Responsible Health and Safety Manager (RHSM)

The RHSM is assigned by the BG HSE Lead to assist with developing appropriate site controls measures and decontamination procedures. When unanticipated contamination is encountered, the RHSM will assist the PM in analyzing the situation to determine new health and safety requirements for continuing work and ensuring those requirements are incorporated into the HSP.

4.3 Safety Coordinator (SC-HW)

The Safety Coordinator-Hazardous Waste (SC-HW) is either the Site Manager (SM), or is designated by the SM to implement the project HSP. The SC-HW assists the SM and RHSM with implementing the hazardous waste operations requirements described in this SOP and the project HSP, including the following:

- Briefing CH2M HILL staff and subcontractors (as required by contract) on site control methods and decontamination procedures
- Assembling the equipment and setting up the stations for the decontamination line before personnel enter the EZ
- Monitoring compliance with the HSP
- Ensuring proper disposal of decontamination materials and fluids in compliance with project plans and hazardous waste regulations
- Inspecting site control methods to ensure integrity and decontamination line for appropriate decontamination supplies

4.4 CH2M HILL Employees

All CH2M HILL employees involved in hazardous waste operations must complete the required training; follow procedures described in this SOP, the HSP, and Activity Hazard Analysis (AHA); and report any unanticipated contamination immediately to the SM or SC-HW.

5.0 Requirements

5.1 General

The general requirements for hazardous waste operations that shall be developed and implemented are listed in the following:

- Site control and decontamination procedures shall be established during the planning stages of the project and must be detailed in the HSP commensurate with the types and extent of contaminants anticipated at the site. Refer to HSE SOP-220, Written Plans, for specific HSP requirements.

- Site control measures shall be implemented during site investigations and remedial actions. Decontamination procedures are required if contaminated personnel or equipment could pose a hazard to workers, the public, or the environment.
- When potentially contaminated material is encountered at a site, an investigation and cleanup operations plan must be developed and implemented in compliance with OSHA 29 CFR 1910.120 or 1926.65, “Hazardous Waste Operations and Emergency Response (HAZWOPER)” standards, until it can be demonstrated using objective data that no employee exposure or potential exposure exists.
- When unanticipated contamination is encountered, work shall be stopped until the contaminants can be identified and control measures can be implemented. Some examples of unanticipated contamination can include stained or discolored soils, soils that have an odor, and surface or groundwater with an odor or sheen. All these signs could indicate the presence of contamination, and the requirements of this SOP shall be followed.

5.2 Site Control Elements

5.2.1 Map

A site map(s) showing the location of work zones (Section 5.2.2) within the site must be included in each HSP. Natural features, such as topography, lakes, prevailing wind direction, and drainage, should be depicted. Man-made features such as buildings, containers, impoundments, pits, and tanks also should appear on the site map.

5.2.2 Work Zones

Field sites are subdivided into work zones that help to control work and reduce the chance of transferring hazardous substances from contaminated areas to clean areas. A schematic representation of site work zones is provided in Attachment 1.

The following provide guidelines for establishing and working in work zones:

- Workers entering or leaving the EZ must pass through controlled access points.
- Workers inside the EZ are required to wear the PPE prescribed in the HSP.
- Workers and materials departing the EZ are decontaminated in the CRZ before passing into the support zone.
- Workers in the CRZ communicate with workers in the EZ and, whenever possible, maintain line-of-sight contact with workers inside the EZ.
- Before items believed to be decontaminated can move into the SZ, the SC-HW must verify they are actually decontaminated.
- Personnel in the SZ usually wear normal work clothes. Location of the command post and other support facilities within the SZ depends on several factors, such as accessibility as determined by topography, open space, and location of highways; wind direction (SZ facilities must be located upwind of the EZ); and availability of utilities, water, and other support materials.

5.2.3 Buddy System

During all activities within the EZ, the buddy system will be used. The objectives of the buddy system include observing partners for signs of physical or chemical exposure, periodically checking the integrity of safety equipment and systems, and summoning help in the event of an emergency.

In addition to working in the EZ, there may be other activities covered by separate SOPs that will also require the use of the buddy system, (e.g., [HSE-203, Confined Space Entry](#)).

The “buddy” is usually a CH2M HILL employee. However, qualified client, contractor, subcontractor, regulatory agency, or principal responsible party (PRP) personnel may fill the buddy role when the parties agree.

5.2.4 Security

Security measures must be implemented by the SC-HW to keep unauthorized persons off the site, to safeguard equipment and supplies stored at the site, and to restrict unauthorized employees from entering the decontamination area/change room, and exclusion zones. The need for enhanced security measures, such as a perimeter fence, fencing around supply areas, and security guards must be determined with the client or owner before site activities begin, and these measures must be described in the HSP. The client (or owner) must approve specific security measures before they are implemented. When a site is not fenced, warning signs may be posted around the site.

A logbook must be maintained at the command post for employees to sign in and sign out for site entry. This logbook becomes part of the project records and provides documentation regarding the arrival and departure of personnel, vehicles, and equipment at the site.

5.2.5 Communications

Internal communication (among team members) and external communication (between the team and outside resources) must be established before work begins. Internal communication consists of face-to-face talking, hand signals, talking over a bullhorn, flag signals, siren or whistle blasts, radio transmissions, or cellular telephones. The SC-HW discusses the internal communication system with team members during site safety briefings. The system must be tested, and documentation of test results must be entered in the SC-HW’s logbook.

External communication systems must be established so that outside help can be summoned in case of onsite emergencies. External communication usually is conducted using an onsite telephone (this can include car telephones or cellular telephones, but check for serviceability beforehand). When a telephone is not available onsite, the nearest offsite telephone must be identified and access to it ascertained before site activities begin. Whether the telephone is onsite or offsite, team members must be told during the site safety briefing where the telephone is and how it is to be used.

Means of emergency transportation must be arranged and verified before the start of site activities. The method of transportation will depend on the nature and extent of injury and the availability of local assistance.

5.3 Decontamination Procedure Elements

Decontamination must be completed within the CRZ. Separate decontamination lines must be set up for personnel and heavy equipment.

Dispose of PPE garments if they show signs of contaminant permeation or penetration (discolorations, stains, or corrosive effects) or the presence of non-removable contamination. When inspections indicate that decontamination procedures are ineffective, corrective actions must be instituted onsite by changing the site-specific decontamination procedures and documenting the changes in the HSP.

5.3.1 Prevention

Hygienic work practices generally decrease the contamination of personnel and equipment onsite. Techniques for reducing the potential for dermal contact with, or inhalation of, contaminants and work procedures and limitations that reduce contact with site contaminants are specified in the HSP and include the following:

- Preparing clean pathways into and out of areas of gross contamination
- Suppressing dust and particulates
- Covering waste piles
- Using remote sampling devices
- Using material handling equipment
- Placing field instruments and monitoring equipment in plastic bags when used in areas of gross contamination

5.3.2 Personnel Decontamination

Personnel decontamination consists of sequential washing, rinsing, and removing (doffing) PPE at stations that make up the decontamination line. Wash, rinse, and remove first items, such as outer booties and gloves, that are usually the most contaminated. Change equipment, such as breathing apparatus tanks or respirator cartridges, after passing through the initial decontamination stations. Next, complete cleaning and removing the lesser-contaminated PPE, such as inner gloves and boots. Attachment 2 contains a general decontamination setup that can be modified for most situations. Consider the following factors when developing site-specific procedures:

- **Type of site contaminant.** Those contaminants that are highly toxic or less soluble in water require more extensive and detailed decontamination procedures.
- **Amount of contamination.** In cases of severe contamination, PPE may have to be washed and rinsed to reduce the hazards.
- **Level of protection.** The layout and number of stations making up the decontamination line varies with the level of protection worn onsite.
- **Tasks performed.** Those remedial tasks involving numerous and lengthy contacts with contaminated materials generally require extensive decontamination.

Site personnel must wash their hands and faces at a field wash station before eating, drinking, or smoking and must shower as soon as practical after completing the day's field

activities. Procedures used when personnel take breaks during the work shift consist of washing, rinsing, and removing outer booties and gloves; washing or removing visibly contaminated clothing; and taking care not to touch the clothing during the break.

5.3.3 Washing Facilities

Clean water, soap, and towels shall be available onsite for washing hands and face before breaks and before leaving the site. A respirator cleaning and sanitizing station shall be set up at those sites where respiratory protection is required. Regular showers and change rooms must be provided in accordance with OSHA 29 CFR 1910.141 if employees remain at the site for long periods of time. A washing machine or commercial washing service should be provided if workers wear nondisposable outer clothing (coveralls) so that contamination is not carried offsite.

5.3.4 Equipment Decontamination

Heavy Equipment requires a separate decontamination facility that must be set up. Heavy equipment is typically provided by CH2M HILL's subcontractors, who are directed to install a decontamination facility in accordance with the contract specifications. When required, decontamination plans will be included as part of the subcontractor's site-specific HSP. Refer to SOP HSE-215, Contracts, Subcontracts, and HSE Management Practices, for additional information on subcontractor safety submittals.

Heavy equipment decontamination areas typically consist of a concrete pad and curbing or other containing structure with a sump to contain wash water. High-pressure water or steam cleaners are commonly used to decontaminate heavy equipment before it leaves the site. Provisions can be required to control liquids, aerosols, and vapors resulting from decontamination operations.

Sampling equipment decontamination procedures are described in the quality assurance project plan (QAPP). The decontamination procedures vary, but are consistent with analytical procedures.

Air monitoring equipment can be difficult to decontaminate. Place any equipment that may become contaminated in clear, plastic bags or cover it with plastic sheeting, and tape the sheeting closed. Ensure openings are provided for the equipment's intake and exhaust. Clean any contaminated air monitoring equipment with detergent wipes.

Personal Protective Equipment (PPE) used during hazardous waste field activities can be chemical protective clothing (CPC) and respirators. Disposable protective clothing made of Tyvek® is used on many sites and does not require decontamination when it is not reused. Decontaminate all nondisposable CPC after each use, and inspect for holes, tears, or other signs of permeation and penetration. Discard disposable inner gloves and booties after each use. Outer gloves may be decontaminated and reused, but typically should be discarded at least weekly. Respirators must be cleaned, sanitized, stored, inspected, and maintained according to HSE-121, [Respiratory Protection](#).

5.3.5 Emergency Decontamination

Emergency procedures for personnel decontamination must be followed during life-threatening medical emergencies, such as personal injury, heat stress, and chemical overexposure. In cases in which personal injury is minor, follow the personnel decontamination procedures outlined in the site-specific HSP.

Lifesaving first-aid procedures take priority over emergency decontamination efforts. Decontaminate personnel to the extent feasible by drenching them before their outer protective clothing is removed or cut away. If outer protective clothing cannot be removed or removal would interfere with lifesaving procedures, wrap the injured person in plastic sheeting or a blanket to reduce the possibility of contaminating the ambulance interior and medical response personnel.

5.3.6 PPE Requirements for Decontamination Workers

The level of protection worn by decontamination workers depends on the type and amount of contamination on personnel and equipment leaving the EZ, but they are usually adequately protected by wearing one level of protection lower than that worn by workers in the EZ. At a minimum, decontamination workers must at least wear protective clothing rated at Level D.

For project sites containing heavy contamination, decontamination workers must wear the same level of protection as workers in the EZ. The major hazard to decontamination personnel is dermal and eye contact with contaminated materials during scrubbing, splashing, or spraying washes or rinse solutions. Splash goggles and face shields provide adequate eye protection; chemical-resistant aprons provide additional protection. Personnel operating high-pressure water or steam cleaning equipment must wear eye and face protection, such as splash goggles and face shields, with appropriate respiratory protection. Full-face respiratory protection with peel-away lens covers may be substituted for goggles and face shield.

5.3.7 Disposal of PPE, Decontamination Materials, and Fluids

Contaminated materials, PPE, and decontamination fluids shall be managed according to the project waste management plan. Refer to [HSE-408, Waste Characterization, Sampling, and Analysis](#) and storage and disposal requirements in accordance with [HSE-409, Hazardous Waste](#), and [HSE-411, Non-Hazardous Waste Management](#).

5.4 Unanticipated Contamination

5.4.1 Stop the Work and Notify the Client

When field staff encounters potentially contaminated materials, the PM must stop work to assess the situation and notify the client. The notification should be verbal, followed by written communication to ensure the client can make a reasonable or timely response. When a party other than CH2M HILL controls the work, that contractor may initiate notification.

5.4.2 Analyze the Situation

Under federal and state law, the person in charge (generally, the client or owner) is required to deal with contamination or hazardous materials. A wide range of such situations and their appropriate responses exist. For example, the situation may require a full investigation and characterization, and interaction with regulatory agencies might be necessary. On the other hand, the situation may be remedied with a call to the local hazardous material (HAZMAT) team that can quickly respond and remove the hazardous materials or contamination. For any situation, the following four basic rules will always apply:

- The client (or owner) must authorize any response to the situation and dispose of the contamination or hazardous material.

- The client (or owner) must take responsibility for reporting to, and interacting with, regulatory agencies.
- Only properly trained and certified personnel may conduct investigations, take samples, or dispose of the contaminated material.
- CH2M HILL may assist the client (or owner) with any of the previously listed rules, provided we receive adequate compensation and liability protection.

5.4.3 Modify the Contract

Contracts usually include a “Differing Site Condition” clause. This clause allocates the risk of unknown site conditions that differ from those indicated in the original scope of work or contract. Unanticipated contamination or hazardous materials would normally be classified as a differing site condition. Any additional work involving unanticipated contamination or hazardous materials should be reviewed to determine any potential duties that could create long-term liability. All contracts must be reviewed by the PM and KA for possible modification to reflect the increased scope, compensation, and liability protection. This contract review includes not only the consulting agreements when CH2M HILL does not control the work, but also any contracts with the party performing the work.

5.4.4 Resume Work

Work affected by the contamination of hazardous materials can only resume when the criteria described in Section 5.4.3 are met and when formally directed to do so by the client (or owner). The directions to resume work must clearly delineate when the work must be done and by whom, and a change order or modification to the contract must be issued by the client (or owner).

6.0 Training

CH2M HILL employees assigned to work on a project for hazardous waste site characterization and remedial action must complete training that meets OSHA HAZWOPER requirements. CH2M HILL International Regions will provide HAZWOPER equivalent training, with concurrence from the Enterprise HSE Training Manager, and to meet any country-specific training related to hazardous waste operations or emergency response. This training applies to workers when they do the following:

- Enter an exclusion (contaminant) zone
- Enter a decontamination zone
- Enter an area where wastes are stored or treated
- Are otherwise potentially exposed to hazardous substances. It is important to note that the term “exposure” refers to exposure at levels below the permissible exposure level (PEL), not to over-exposure at levels above the PEL, and exposure includes all potential routes of entry including dermal and ingestion through contact.

OSHA HAZWOPER Training consists of the following:

- 40-hour initial training
- SC-HW when supervising workers or implementing the project HSE program

- Annual 8-hour Refresher

7.0 References



U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (general industry standard) and 29 CFR 1926.65, "Hazardous Waste Operations and Emergency Response" (construction standard).

8.0 Attachments

Attachment 1: [Work Zones](#)

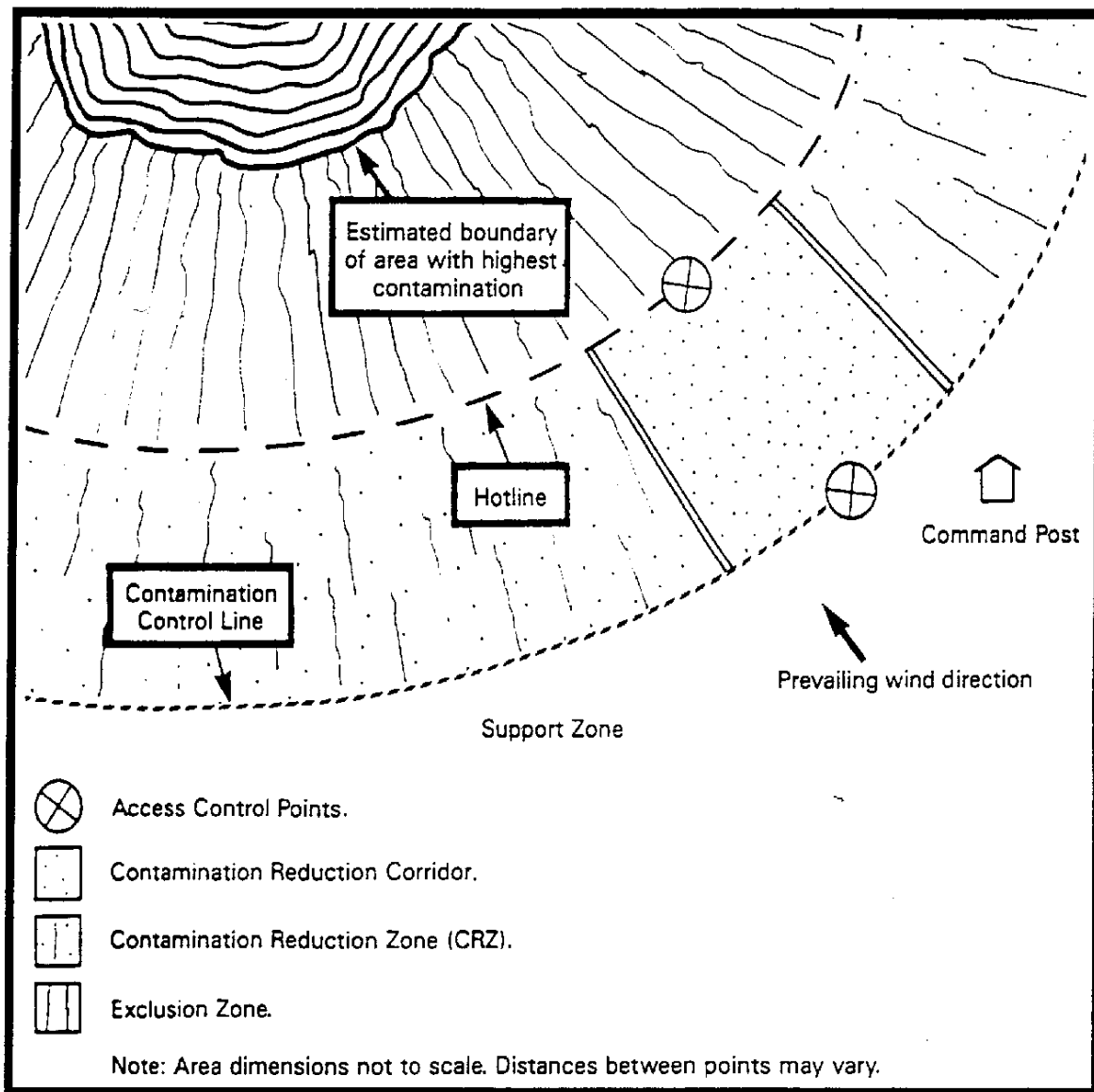
Attachment 2: [Personnel Decontamination Line Schematic](#)

9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	7/02/2007	Combined Standard of Practices 218, Unanticipated Contamination; 506, Decontamination; and 510, Site Control into one Standard Operating Procedure	Sandy Wise; Jeff Stumpf	
2	07/03/2013	Clarification on applicability to International Regions and for site security measures	Jeff Stumpf	



Attachment 1: Work Zones



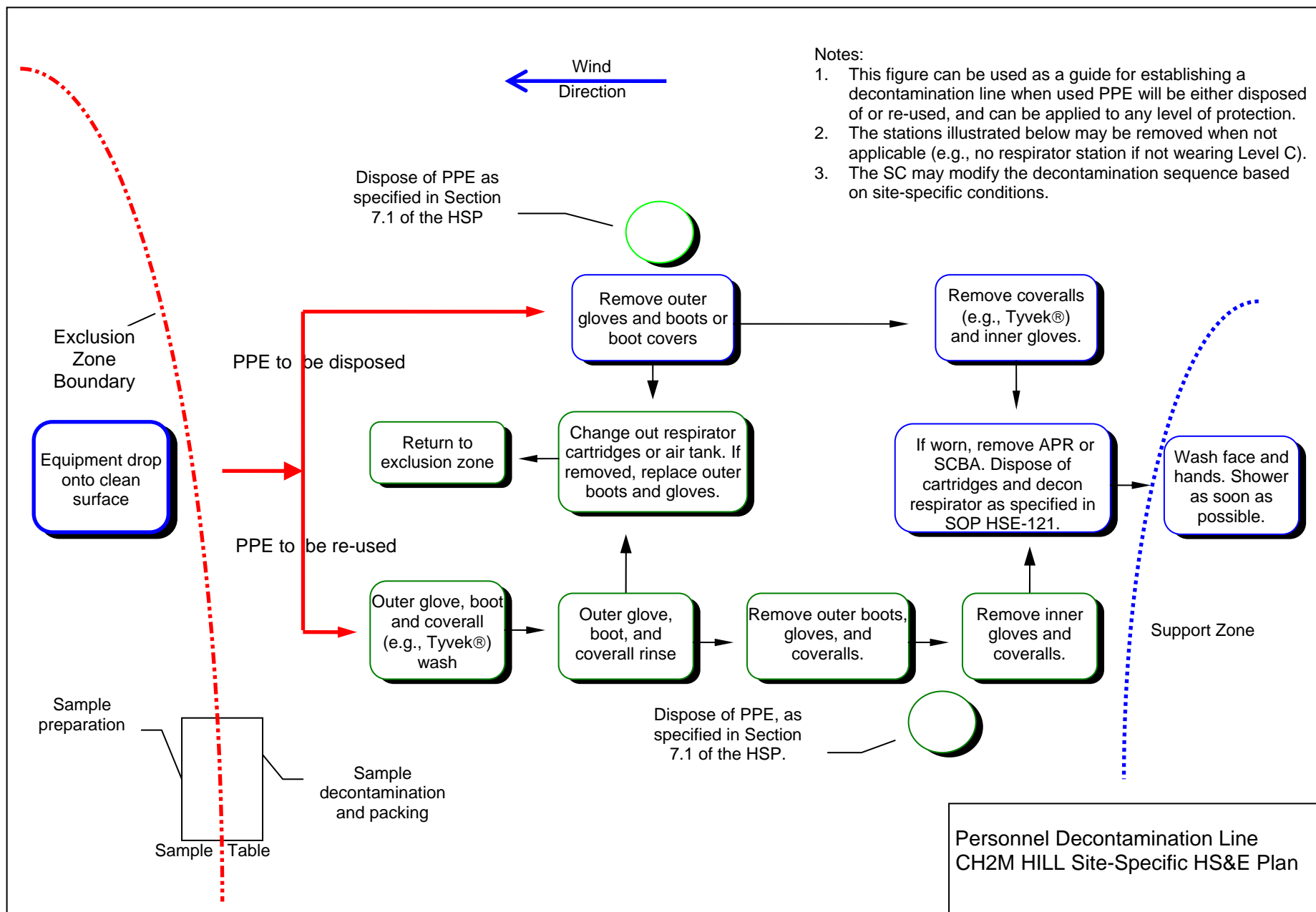
Work Zones

Reproduced from: NIOSH/OSHA/USCG/EPA. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

U.S. Government Printing Office. 1985.



Attachment 2: Personnel Decontamination Line Schematic





Earthmoving Equipment

Enterprise Standard Operating Procedure HSE-306

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups must comply, when performing earthmoving equipment operations.

2.0 Scope and Application

2.1 Scope

This SOP provides information on the spectrum of hazards and issues to be addressed during each phase of earthmoving equipment operations. Earthmoving equipment includes scrapers, graders, rollers, compactors, dump trucks, backhoes, bulldozers, front-end loaders, power shovels, ditchers, trenchers, skid steers, bobcats, and other similar excavating equipment. Earthmoving equipment hazards addressed in this SOP include contacting overhead power lines, overturning because of top-heavy configuration and poor footing, excavating into underground utilities or structures, being struck by earthmoving equipment or falling loads from the equipment, and catching persons in moving parts of earthmoving equipment.

CH2M HILL employees who work in proximity to earthmoving equipment activities must take precautions to avoid these hazards by being aware of and following the safe work practices provided in Section 5.1 of this SOP. CH2M HILL employees who operate earthmoving equipment must follow the earthmoving equipment safety requirements provided in Section 5.2 of this SOP.

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental and Occupational Safety and Health (OSHA) programs may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (HSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HS&E) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HS&E regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by earthmoving equipment operations, regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);
- CH2M HILL provides oversight of subcontractor's earthmoving equipment operations; and/or
- CH2M HILL self-performs earthmoving equipment operations.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to earthmoving equipment operations:

3.0 Definitions

3.1 Qualified Operators

Qualified operators are authorized by their employer to operate earthmoving equipment on projects. Qualified operators shall have knowledge of the requirements of OSHA standard and shall be capable of operating earthmoving equipment in a safe manner.

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the Site Manager (SM), or is designated by the SM to implement the project HS&E Plan and who has successfully completed all required SC training. The SC trains CH2M HILL employees exposed to the hazards posed by earthmoving equipment operation, in hazard awareness and control procedures, as detailed in the site-specific health and safety plan. The SC also oversees subcontractor's earthmoving equipment operations.

4.2 Designated Person

An authorized CH2M HILL earthmoving equipment operator evaluation designated person evaluates and approves CH2M HILL employees who are required to operate earthmoving equipment as qualified earthmoving equipment operators.

4.3 Qualified Operator

Only qualified and authorized operators are permitted to operate earthmoving equipment on CH2M HILL projects. CH2M HILL employees who are required to operate earthmoving equipment shall be evaluated and approved as qualified earthmoving equipment operators.

When the subcontractor performs earthmoving equipment operations, the subcontractor shall provide qualified operators to perform these operations.

4.4 Business Group Health and Safety Leads

The BG H&S Leads are responsible for overseeing the implementation of this Enterprise SOP for all projects in their BG. The BG H&S Lead also has the authority to approve deviation from this standard to accommodate local requirements.

The BG H&S Lead or his designee receives the earthmoving equipment operator evaluation form from the project and maintains a list of CH2M HILL qualified earthmoving equipment operators. The BG H&S Lead or his designee also maintains a list of authorized CH2M HILL designated persons.

5.0 Requirements

The following earthmoving equipment requirements outlined in this Enterprise SOP must be implemented.

5.1 Safe Work Practices

These safe work practices are to be followed by CH2M HILL employees who are exposed to the hazards posed by earthmoving equipment, regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

- Personnel shall maintain a safe distance from operating earthmoving equipment and shall stay alert of equipment movement. Personnel shall avoid placing themselves between fixed objects and operating equipment and equipment pinch points, and remain outside of the equipment swing and turning radius. Personnel shall pay attention to backup alarms, but not rely on them for protection. Personnel should never turn their backs on operating equipment.
- Personnel positioned in proximity to operating earthmoving equipment shall maintain close communication with the equipment operator. Positioning personnel close to operating equipment is discouraged and shall only occur when absolutely necessary. When required to work near to operating equipment, personnel shall wear high-visibility vests to increase visibility to equipment operators. For work performed after daylight hours, vests shall be made of reflective material or include a reflective stripe or panel.
- Personnel shall approach operating earthmoving equipment only after receiving the operator's attention. The operator shall acknowledge the personnel's presence and stop movement of the equipment. Caution shall be used when standing next to idle equipment; when equipment is placed in gear it can lurch forward or backward. Personnel shall never approach operating equipment from the side or rear where the operator's vision is compromised.

- Personnel shall not ride on earthmoving equipment unless it is specifically designed to accommodate passengers. Personnel shall only ride in seats that are provided for transportation and that are equipped with seat belts.
- Personnel shall not pass or stand underneath the elevated portion of earthmoving equipment, loaded or empty.
- Personnel shall stay as clear as possible of all hoisting operations. Loads shall not be hoisted overhead of personnel.
- Earthmoving equipment shall not be used to lift or lower personnel.
- If earthmoving equipment becomes electrically energized, personnel shall not touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party shall be contacted to have lines de-energized prior to approaching the equipment.
- Personnel shall wear the appropriate PPE. Minimum protection includes safety-toed shoes/boots, hard hats, safety glasses, and hearing protection. Gloves, coveralls, Tyvek, and respirators may also be required based on the chemical hazards (refer to the project's written site-specific HS&E plan).

5.2 Regulatory and Industry Standards

The following subsections provide the minimum regulatory and industry standard requirements pertaining to earthmoving equipment operations. These requirements apply when CH2M HILL is overseeing subcontractor's earthmoving equipment operations and self-performing these operations.

5.2.1 Prior to Operating Earthmoving Equipment

The following requirements apply prior to operating earthmoving equipment:

- Only qualified and authorized personnel who are familiar with the earthmoving equipment's safe operating instructions are permitted to operate earthmoving equipment.
- A daily safety briefing/meeting shall be conducted with all earthmoving equipment operators to discuss the work planned for the day and the HS&E requirements to be followed.
- Earthmoving equipment and associated components shall be inspected each day, before use, to ensure safe operational condition. All defective components shall be corrected before the equipment is placed in service. If earthmoving equipment is used on multiple shifts, an inspection shall be done on each shift.
- Written approval shall be obtained from the earthmoving equipment manufacturer before any attachment, other than factory installed, is used or before any modification is made to earthmoving equipment that could affect the capacity or safe operation of the equipment.
- Earthmoving equipment shall be used in reverse only when a backup alarm is in operation or a spotter is provided to guide the movement.

- Bi-directional equipment shall be equipped with a horn, distinguishable from the surrounding noise level, that shall be operated as needed when the machine is in motion.
- Seat belts shall be provided for earthmoving equipment except for equipment that is designed only for standup operation and for equipment that does not have roll-over protective structures (ROPS) or adequate canopy protection.
- ROPS shall be provided on all scrapers, graders, front-end loaders, bulldozers, and industrial tractors.
- Earthmoving equipment shall have a service braking system capable of stopping and holding the equipment fully loaded.
- Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, shall be equipped with at least two headlights and two taillights in operable condition.
- All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.
- All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of the equipment. Cracked or broken glass must be replaced.
- Machine guards shall be in place for rotating parts, chains, sprockets, belts, pinch points, and similar items. Guards removed for repair purposes shall be replaced when work is completed.
- All haulage vehicles whose payload is loaded by means of cranes, power shovels, loaders, or similar equipment shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.
- Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device that will prevent accidental starting or tripping of the mechanism.
- When the potential exists for hazardous atmospheres to develop within an excavation location, air monitoring shall be conducted to ensure that it is safe to continue excavation operations (refer to the project's written safety plan).

5.2.2 Earthmoving Equipment Placement

The following requirements apply to the placement of earthmoving equipment:

- Earthmoving equipment shall be positioned on firm, level surfaces when possible. If outriggers are provided on the equipment, they shall be completely retracted and positioned on solid surfaces or cribbing.

- The location of underground utilities such as electric, fuel, water, cable, telephone, and sewer - either in service or abandoned - shall be identified before excavation is permitted. Utility companies and/or installation owners shall be contacted for exact locations. When the exact location cannot be identified, detection equipment or other acceptable means of locating the utility lines shall be used before excavation.
- Safe clearance distances must be maintained between overhead power lines and any part of earthmoving equipment unless the power lines have been de-energized and grounded or where insulating barriers have been installed to prevent physical contact. To avoid physical contact and potential arcing from the power line to earthmoving equipment, equipment shall remain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV. When it is difficult for the equipment operator to maintain the safe clearance distance, a person shall be designated to observe the clearance and warn the operator.
- The following safe clearance distances shall be maintained while traveling under overhead power lines with no load and equipment lowered: 4 feet for voltages less than 50 kV, 10 feet for voltages between 50 kV and 345 kV, and 16 feet for voltages between 346 kV and 750 kV.
- When earthmoving equipment is required to approach the edge of an excavation and the operator does not have a clear and direct view of the edge, warning systems such as barricades, hand and/or mechanical signals, or stop logs shall be in place to remind the operator of the location of the edge.
- Equipment left unattended at night adjacent to a highway or construction area where work is in progress shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.
- Whenever earthmoving equipment is not in use, all ground-engaging tools shall be lowered to the ground and the parking brake set. Equipment parked on inclines shall have the parking brake set and wheels chocked.

5.2.3 Earthmoving Equipment Operation

The following requirements apply to operating earthmoving equipment:

- Earthmoving equipment shall only be operated on roadways and grades that are constructed and maintained to accommodate safe movement of the equipment.
- Earthmoving equipment should be operated only at a safe speeds taking into account terrain, weather, vehicular and personnel traffic, and the equipment's mechanical limitations.
- The operator shall have an unobstructed view of the travel path to ensure there are no obstructions, pedestrians, overhead utilities, or ground conditions that would prevent safe travel.
- Equipment should not be operated during inclement weather (in particular, lightning storms).

- Windows shall be kept clean and mirrors adjusted correctly. The seat shall be adjusted and seat belt fastened securely. Before starting the engine, the operator shall sound the horn to alert personnel in the vicinity. With the engine started, operator shall check gauges on the instrument panel for proper operation. Prior to travel, the operator shall sound the horn and observe the area surrounding the travel path.
- Operators shall keep arms, legs, and head inside cab while operating the equipment.
- Operators loading or unloading material to or from vehicles are responsible for verifying that the vehicle occupants are safely protected by a cab shield or canopy or in a safe area outside the vehicle.
- When a signal person is required, the signal person shall stay visible to the operator and both shall agree on the signals to be used.
- Earthmoving equipment used for hoisting purposes shall be conducted according to the equipment manufacturer's operating manual specifications and within the maximum capacity of the equipment.
- The lifting and hauling maximum capacities of equipment shall not be exceeded. Operators shall be knowledgeable of the maximum capacities of each piece of equipment operated.

5.2.4 Earthmoving Equipment Maintenance

The following requirements apply to maintaining earthmoving equipment:

- Components found to be in defective condition during inspections or during equipment operation should be repaired immediately.
- Earthmoving equipment or attachments that are suspended by slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before personnel are permitted to work under or between them. Blades, buckets, dump bodies, and similar equipment shall be either fully lowered or blocked when being repaired.
- Equipment maintenance shall be performed only after appropriate lockout/tagout procedures have been implemented. All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.
- A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.
- All work areas, platforms, walkways, scaffolding, and other accesses should be maintained free of materials, debris, obstructions, and substances such as ice, grease, or oil.

5.3 Subcontractor HSE Oversight

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HS&E regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL's oversight does not

relieve them of their own responsibility for effective implementation and enforcement of HS&E requirements.

The “Subcontractor Safety Procedure Criteria – Earthmoving Equipment” presented in Attachment 1 provides the minimum criteria for subcontractor safety procedures. These criteria may be used by the HS&E staff to review submitted subcontractor procedures when CH2M HILL is performing oversight of subcontractor’s operations.

The subcontractor’s supervisor serves as the overall competent person for construction activities. When the subcontractor performs earthmoving equipment operations, the subcontractor shall provide qualified operators to perform these operations. Proof of earthmoving equipment operator qualifications shall be a required HSE submittal for the subcontractor prior to mobilization. Subcontractors operating earthmoving equipment are required to document daily inspections.

5.4 CH2M HILL Self-Perform Requirements

When CH2M HILL self-performs earthmoving equipment operations, CH2M HILL shall provide qualified operators to perform these operations. Earthmoving equipment operated by CH2M HILL employees shall be inspected using the “Earthmoving Equipment Inspection Form” presented in Attachment 2.

6.0 Training Requirements

CH2M HILL employees, who are exposed to the hazards posed by earthmoving equipment, are required to be trained in hazard awareness and control procedures by the SC, as detailed in the site-specific health and safety plan. The SC must successfully complete all CH2M HILL required SC training.

CH2M HILL employees, who work on construction projects, are required to complete the 10-Hour Construction Safety Awareness training course.

Only qualified and authorized operators are permitted to operate earthmoving equipment on CH2M HILL projects. CH2M HILL employees who are required to operate earthmoving equipment shall be evaluated and approved as qualified earthmoving equipment operators by an authorized CH2M HILL earthmoving equipment operator evaluation designated person. The designated person shall conduct and document the evaluation process by completing the Earthmoving Equipment Operator Evaluation Form presented in Attachment 3.

The evaluation process shall be completed for each specific piece of equipment to be operated. A copy of the evaluation form shall be maintained in the project files and the original sent to The BG H&S Lead, who may be contacted for a list of CH2M HILL qualified earthmoving equipment operators. The BG H&S Lead also maintains a list of authorized CH2M HILL designated persons.

As part of the earthmoving equipment operator evaluation process, each potential CH2M HILL operator is required to pass an earthmoving equipment operator exam. An Earthmoving Equipment Operator Exam Guideline is presented in Attachment 4 to assist the CH2M HILL earthmoving equipment operator evaluation designated person in

administering this exam. Each designated person will also be provided the operator exam and answer sheet.

Subcontractors are responsible for complying with all applicable HS&E training regulations providing the training necessary to complete their tasks safely. Subcontractor training shall be verified prior to the start of field operations.


7.0 Forms, Permits and Checklists

The “HS&E Self-Assessment Checklist – Earthmoving Equipment in Attachment 5 may be used to verify subcontractor’s and CH2M HILL self-perform compliance with safety procedures, established practices, regulations, and industry standards. The RHSM specifies the frequency in which this checklist should be completed by the SC and provides this information in the project’s written safety plan. The RHSM may also use this checklist when performing HS&E audits at CH2M HILL projects, including subcontractor’s activities.

8.0 References

9.0 Attachments

Attachment 1	Subcontractor Safety Procedure Criteria- Earthmoving Equipment
Attachment 2	CH2M HILL Earthmoving Equipment Inspection Form
Attachment 3	CH2M HILL Earthmoving Equipment Operator Evaluation Form
Attachment 4	CH2M HILL Earthmoving Equipment Operator Exam Guideline
Attachment 5	HS&E Self Assessment Checklist-Earthmoving Equipment

Revision	Date	Description	Prepared by:	Approved by:
1	10/24/07	<p>Revised existing CH2M HILL SOP to apply when: employees are exposed to the hazard; oversight of subcontractor operations and CH2M HILL self-perform operations.</p> <p>The BG H&S Lead or his designee receives the earthmoving equipment operator evaluation form from the project and maintains a list of CH2M HILL qualified earthmoving equipment operators. The BG H&S Lead or his designee also maintains a list of authorized CH2M HILL designated persons.</p> <p>SOP requirements include safe work practices and regulatory and industry standards pertaining to earthmoving equipment operations.</p> <p>Subcontractor Safety Procedures Criteria and HSE Self-Assessment Checklist are not mandatory, but are provided in the attachments as a tool to oversee subcontractor's operations and to assess CH2M HILL self perform compliance with the SOP.</p>	Angelo Liberatore	



Attachment 1: Subcontractor Safety Procedure Criteria- Earthmoving Equipment

The following criteria are not intended to be all inclusive, but are provided as a tool to facilitate development and review of subcontractor safety procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Earthmoving Equipment Safety Procedures:

1. Provide name and qualifications of the “competent person” responsible for earthmoving equipment (years and type of experience, training background, etc.):
2. Provide qualifications of equipment operators (years and type of experience, training background, etc.):
3. Describe earthmoving equipment and associated component inspection criteria or procedures (frequency of inspections, visual vs. written inspections, items that are inspected):
4. Describe methods of identifying underground utilities (contacting utility companies, detection equipment):
5. Describe methods of avoiding contact with overhead power lines: (de-energizing and grounding, insulating, safe clearance distances)
6. Describe methods of avoiding “on-foot” traffic and other safe operating procedures (backup alarms, horns, spotters, high-visibility vests, safe operating speed and slope, etc.):
7. Describe methods to identify hazardous atmospheres and controls (detection equipment and controls):
8. Verify that earthmoving equipment is in good operating condition (including seat belts, rollover protective systems, braking system, lights, cab glass, pressurized hoses and lines, operator controls, machine guards, and accessories):
9. Describe on-the-job maintenance procedures (including lockout/tagout, blocking, cribbing, etc.):
10. Describe safe work practices for other activities to be performed during this project (use of ladders, fall protection, use of electrical power tools, use of personal protective equipment, etc.):



Attachment 2: Earthmoving Equipment Inspection Form



EARTHMOVING EQUIPMENT INSPECTION FORM

This form shall be used to document CH2M HILL earthmoving equipment inspections. Earthmoving equipment shall be inspected each day and shift prior to use. All components shall be inspected for damage and proper operation. Any component failing the inspection shall be corrected prior to earthmoving equipment use. Check each box after passing inspection and initial bottom of form each day.

Equipment Name: _____ cation #: _____ Week of: _____

INSPECTION ITEM	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Visual Checks							
Operating manual - present							
Controls - labeled as to their function, visible and legible, safety latches/guards present							
Tires/tracks - proper inflation/tension, not excessively worn or damaged							
Fluid levels/leaks - engine, transmission, hydraulic, radiator, swing motor and PTO oils.							
Lubrication - to the manufacturer's specifications							
Air filter gauge - gauge is not in the red zone.							
Hydraulics - no fluid leaks, connections tight, hoses, cylinders free of damage.							
Hoses/belts - held securely, not loose or rubbing, no excessive wear or crimping							
Fuel system - tank free of damage, all valves/hoses secure, no leaks							
Body & ground-engaging tools - no damage, cracks, bends, or excessive wear.							
Cylinders/articulation joints- no worn pins, loose connections or other damage.							
Roll-over protective structures (ROPS) - no damage, no cracks or bends							
Seat belt/bar - required unless operator stands or no ROPS							
Handrails, steps, platforms - clean, free from grease, oil, clear of obstructions.							
Cab glass - safety glass, clean, no cracks or visible distortion							
Mirrors - properly adjusted, no cracks or visible distortion							
Windshield wipers, fluid, and defroster - functioning							
Machine guards - present and in good condition							
Fire extinguisher - present and charged							
Operational Checks - check items through normal maneuvers							
Horn & back-up alarm - operating and distinguishable from surrounding noise							
Lights, directional signals, and brake lights - functioning							
Gauges/indicators - visible and working properly							
Operating controls - lift and tilt functioning properly							
Outriggers, if present - functioning properly							
Accelerator - even acceleration, does not stick							
Brakes (service & parking) - brings to complete stop, holds in fixed position							
Steering - responsive, minimal looseness							
Exhaust system - guarded if potential for contact, no signs of sparks/leaks							
Inspector's Initials							



Attachment 3: Earthmoving Equipment Operator Evaluation Form

CH2M HILL employees who are required to operate earthmoving equipment shall be evaluated and approved as qualified earthmoving equipment operators by an authorized CH2M HILL Earthmoving Equipment Operator Evaluation Designated Persons (DP).

This form shall be used by the DP to assess, approve, and document the qualifications of CH2M HILL employees who are required to operate earthmoving equipment.

Employee (Operator) Name: _____ CH2M HILL employee #: _____

CH2M HILL Company: _____ Business Group: _____ Region: _____

Type of equipment to be operated: _____

1. Background Review

Resume and other documentation (training certificates) shall be reviewed and verified with previous employers. The individual shall also possess a valid driver's license. This review should take place prior to hiring.

☐ Background Review found to be adequate. Date: ____/____/____ DP initials: ____

2. Classroom Evaluation

- a. Employee shall read and understand the manufacturer's Equipment Operation Manual for the specific piece of equipment to be operated.
- b. Employee shall read and understand the CH2M HILL *Earthmoving Equipment* (HSE-306) and *Excavations* (HSE-307) Standards of Practice.
- c. DP shall discuss safe operating practices with the employee.
- d. Employee shall pass CH2M HILL's written earthmoving equipment operator exam. (See Attachment 2 for exam guidelines)

☐ Classroom Evaluation successfully completed. Date: ____/____/____ DP initials: ____

3. Field Evaluation

a. Equipment Awareness, Inspection and Maintenance

The DP shall observe the employee perform a daily inspection using the Earthmoving Equipment Inspection Form. The employee shall demonstrate the ability to recognize deficient conditions that could affect the safe operation of the equipment. In addition, the operator shall demonstrate awareness of the following:

- ☐ Location of vital fluid reservoirs
- ☐ Location of all lubrication points
- ☐ Proper fueling procedures
- ☐ Location and function of safety disabling devices (if equipped)
- ☐ Location and function of safety devices (fire extinguisher, back-up alarm, seat belt/bar, guards)
- ☐ Location of manufacturer warning labels, weight of equipment, and lift capacities labels
- ☐ Location and function of all gauges, indicators and controls (horn, lights, mirrors, etc.)
- ☐ Acceptable conditions for passing items during daily inspections
- ☐ Periodic maintenance requirements

b. Equipment Operation

The DP shall observe the employee operating the equipment through normal maneuvers. The employee shall demonstrate the ability to operate the equipment safely and in accordance with the manufacturer's guidelines.

- ☐ Demonstrates ability to safely start equipment in preparation for use (proper start-up sequence followed)
- ☐ Understands function and proper appearance of all gauges and indicators
- ☐ Understands location and use of all equipment controls
- ☐ Checks front, side, and rear of equipment for pedestrians, traffic and obstructions
- ☐ Demonstrates smooth and safe equipment travel
- ☐ Demonstrates smooth and safe control operations
- ☐ Demonstrates safe loading and binding of equipment for travel
- ☐ Demonstrates normal shut-down procedures
- ☐ Demonstrates emergency shut-down procedures
- ☐ Demonstrates safe parking and storage of equipment

- ☐ Field Evaluation successfully completed. Date: ____/____/____ DP initials: _____

Operator Acknowledgement

I have reviewed and understand all of the information listed above. I also understand that as an operator of this equipment, I am responsible for daily inspections and maintenance as well as the safe and efficient operation of the equipment listed above.

Operator Name_____
Signature_____
Date**Qualification approval**

The employee has completed the earthmoving equipment operator evaluation process and is qualified to operate the type of earthmoving equipment identified above.

DP Name_____
Signature_____
Date_____
HS&E Name_____
Signature_____
Date

A copy of this evaluation form shall be maintained in the project file and the original sent to the HS&E department for retention.



Attachment 4:

Earthmoving Equipment Operator Exam Guideline

This guideline is provided to assist the CH2M HILL Earthmoving Equipment Operator Evaluation Designated Person (DP) in administering and processing the earthmoving equipment operator exam.

1. The earthmoving equipment operator exam and answer key is maintained on the HS&E limited access web page and may be obtained from the HS&E department.
2. The DP shall administer the exam to each potential CH2M HILL earthmoving equipment operator as part of the evaluation process outlined in the CH2M HILL Earthmoving Equipment Operator Evaluation Form (Section 2, d).
3. CH2M HILL earthmoving equipment operators must be evaluated for each specific piece of equipment to be operated; however, this exam is only required to be taken and passed one time by each operator. Once an operator has passed this exam, no further testing is required.
4. The DP shall review each question answered incorrectly to ensure the operator has a clear understanding of the specific requirement.
5. A specific passing grade has not been established for this exam. The DP shall use their judgment as to whether an individual has an adequate knowledge of the safety issues pertaining to the operation of earthmoving equipment. This exam is only a tool to evaluate the individuals level of understanding.
6. Upon completion and review of the exam, the DP shall sign, date, and indicate whether the individual passed or failed the exam. The exam shall then be sent to the HS&E department for retention.



Attachment 5: HSE Self-Assessment Checklist-Earthmoving Equipment



HS&E Self-Assessment Checklist - EARTHMOVING EQUIPMENT

Page 1 of 2

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to the hazards of earthmoving equipment operations, 2) CH2M HILL employees are operating earthmoving equipment, and/or 3) CH2M HILL provides oversight of a subcontractor operating earthmoving equipment.

The CH2M HILL Safety Coordinator may consult with subcontractors operating earthmoving equipment when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards (complete Section 1).
- ☐ Evaluate CH2M HILL employees operating earthmoving equipment (complete entire checklist).
- ☐ Evaluate CH2M HILL subcontractor's compliance with earthmoving equipment safety requirements (complete entire checklist). Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-306.

SAFE WORK PRACTICES (5.1)

SECTION 1

Yes No N/A N/O

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel maintaining safe distance from operating equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Positioning personnel in close proximity to operating equipment is avoided | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Personnel wearing high-visibility and/or reflective vests when close to operating equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Personnel approach operating equipment safely | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Personnel riding only in seats of equipment cab and using seat belts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel not positioned under elevated portions of equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel not positioned under hoisted loads | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Personnel not hoisted by equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Personnel do not to approach equipment that has become electrically energized | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Personnel wearing appropriate PPE, per HSP/FSI | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

EQUIPMENT SAFETY REQUIREMENTS PRIOR TO OPERATING EQUIPMENT (5.2.1)	SECTION 2	Yes	No	N/A	N/O
11. Only qualified and authorized personnel operating equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Daily safety briefing/meeting conducted with equipment operators		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Daily inspection of equipment conducted and documented		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Modifications and attachments used approved by equipment manufacturer		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Backup alarm or spotter used when backing equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Operational horn provided on bi-directional equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Seat belts are provided and used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Rollover protective structures (ROPS) provided		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Braking system capable of stopping full payload		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Headlights and taillights operable when additional light required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Brake lights in operable condition		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Cab glass provides no visible distortion to the operator		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. All machine guards are in place		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Hauling equipment (dump trucks) provided with cab shield or canopy		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Dump truck beds provided with positive means of support during maintenance or inspection		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Dump truck operating levers provided with latch to prevent accidental dumping		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Air monitoring conducted per HSP/FSI for hazardous atmospheres		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT PLACEMENT (5.2.2)					
28. Equipment position on firm/level surface, outriggers used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Location of underground utilities identified		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Safe clearance distance maintained while working under overhead power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Safe distance is maintained while traveling under power lines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Warning system used to remind operator of excavation edge		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Unattended equipment visibly marked at night		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Tools lowered/parking brake set when not in use, wheels chocked when parked on incline		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT OPERATION (5.2.3)					
35. Equipment operated on safe roadways and grades		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Equipment operated at safe speed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Operators maintain unobstructed view of travel path		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Equipment not operated during inclement weather, lightning storms		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Equipment started and moved safely		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Operators keep body parts inside cab during operation		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Vehicle occupants in safe position while loading/unloading		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Signal person visible to operator when required		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Equipment used for hoisting done according to equipment manufacturer specifications		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Lifting and hauling capacities are not exceeded		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT MAINTENANCE (5.2.4)					
45. Defective components repaired immediately		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Suspended equipment or attachments supported prior to work under or between		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Lockout/tagout procedures used prior to maintenance		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Tires on split rims removed using safety tire rack or cage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Good housekeeping maintained on and around equipment		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Excavation and Trenching Safety

Enterprise Standard Operating Procedure HSE-307

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL legal entities and business groups (BGs) must comply with when performing excavation and trenching activities.

This SOP provides information about the spectrum of hazards and issues to be addressed during each phase of a project associated with excavation operations. Excavation hazards addressed in this SOP include exposure to cave-ins, falls, falling objects, hazardous atmospheres, unstable structures, and excavating into underground utilities.

2.0 Scope and Application

This SOP applies enterprise-wide to all CH2M HILL legal entities and BGs, their employees, subcontractors, and their lower-tier subcontractors that operate in the United States (U.S.) and internationally.

Some state's Occupational Safety and Health Administration (OSHA) plans may have more stringent requirements. Contact the appropriate Responsible BG health and safety manager (RHSM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health and safety (H&S) regulations (such as Canada or Australia) shall prevail, and a country-specific addendum to this SOP should be developed to comply with those specific H&S regulations.

This Enterprise SOP applies when:

- CH2M HILL employees enter excavations, regardless of the company responsible for excavation safety (CH2M HILL, subcontractor, or third party contractor)
- CH2M HILL self-performs excavation activities; and/or,
- CH2M HILL provides oversight of subcontractor's excavation activities

This SOP does not apply to excavation activities in areas with known or potential ordnance explosives (OE)/unexploded ordnance (UXO) hazards. These requirements are addressed in HSE-610, *Explosives Usage and Munitions Response*.

2.1 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to excavation activities include the following:

- [HSE-306 *Earthmoving Equipment*](#)
- [HSE-610, *Explosive Usage and Munitions*](#)
- [HSE-408, *Waste Management: Analysis and Characterization*](#)
- [HSE-416, *Waste Management: Wastewater and Stormwater*](#)

- [HSE-409, Waste Management: Hazardous Waste](#)
- [HSE-218, Hazardous Waste Operations](#)

3.0 Definitions

The following definitions are used in this excavation and trenching SOP.

3.1 Benching

Benching is a method of protecting personnel from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

3.2 Company Responsible for Excavation Safety

The party that has direct control over the excavation operations is responsible for excavation safety. This could be CH2M HILL, a subcontractor, or an independent third party. When CH2M HILL self-performs excavation operations, CH2M HILL assumes responsibility for excavation safety. When CH2M HILL hires a subcontractor to perform an excavation operation, the subcontractor assumes responsibility for excavation safety. When CH2M HILL employees must enter excavations on projects controlled by an independent third party contractor, the third party contractor assumes responsibility for excavation safety.

3.3 Competent Person

A competent person is one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The company responsible for excavation safety designates the excavation-specific competent person.

3.4 Excavation

An excavation is any man-made cut, cavity, trench, or depression in an earth surface that is formed by earth removal.

3.5 Hazardous Atmosphere

A hazardous atmosphere is one that by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic, or otherwise harmful, may cause death, illness, or injury. Specific examples of hazardous atmospheres are provided below.

- Oxygen-deficient atmospheres contain less than 19.5 percent oxygen and can result in a range of symptoms, from dizziness to unconsciousness, and even death at extremely low levels.
- Oxygen-enriched atmospheres contain greater than 23.5 percent oxygen and can increase the flammability of combustible materials.
- Explosive atmospheres contain flammable gases that exceed 10 percent of the lower explosive limit (LEL).
- Carbon monoxide from the exhausts of earthmoving equipment can collect in excavations. Carbon monoxide causes oxygen starvation and can be fatal at a concentration of 1 percent [10,000 parts per million (ppm)] after a 1-minute exposure.

Ventilation or respiratory protection is required when carbon monoxide levels exceed 35 ppm.

- Toxic atmospheres may develop depending on the level of contamination in the soil. Refer to the site-specific health, safety and environment (HS&E) plan or field safety instructions for more details.

3.6 Independent Third Party Contractor

An independent third party contractor has no contractual relationship with CH2M HILL and is contracted directly to the owner.

3.7 Protective Systems

Protective systems provide a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems and other systems that provide the necessary protection.

3.8 Shielding

Shielding is a structure that is able to withstand the forces imposed on it by a cave-in, thereby protecting personnel within the structure. Shields can be permanent structures or they can be designed to be portable and moved as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with local regulatory agency requirements. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

3.9 Shoring

A structure such as a metal hydraulic, mechanical, or timber shoring system supports the sides of an excavation and is designed to prevent cave-ins.

3.10 Sloping

Sloping is a method of excavating in which the sides of an excavation are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies depending on such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

3.11 Stable Rock

Stable rock is natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

3.12 Trench

A trench is a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters). An excavation is also considered to be a trench if forms or other structures are installed or constructed in the excavation that reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 meters) or less (measured at the bottom of the excavation).

3.13 Type A Soil

Type A soils are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (14,629 kilograms per square meter) or greater. Type A soils include clay, silty clay, sandy clay, clay loam, caliche, hardpan, and sometimes silty clay loam and sandy clay loam. No soil should be classified as Type A if it is fissured; if it is subject to vibration from heavy traffic, pile driving, or similar activities; if it was previously disturbed; or if it is part of a sloped, layered system in which the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

3.14 Type B Soil

Type B soils are cohesive soils with an unconfined compressive strength greater than 0.5-ton per square foot (4,876 kilograms per square meter) but less than 1.5 tons per square foot (14,629 kilograms per square meter). Type B soils include granular cohesionless soils such as angular gravel, silt, silt loam, sandy loam, and sometimes silty clay loam and sandy clay loam; previously disturbed soils that are not Type C; fissured soils and soils subject to vibration that would otherwise be classified as Type A; dry rock that is not stable; and material that is part of a sloped, layered system in which the layers dip on a slope less steep than four horizontal to one vertical (4H:1V).

3.15 Type C Soil

Type C soils are cohesive soils with an unconfined compressive strength of 0.5-ton per square foot (4,876 kilograms per square meter) or less. Type C soils include granular soils such as gravel, sand, and loamy sand; submerged soil; soil from which water is freely seeping; submerged rock that is not stable; or material in a sloped, layered system in which the layers dip into the excavation at a slope of four horizontal to one vertical (4H:1V) or steeper.

4.0 Roles and Responsibilities

The following sections outline the roles and responsibilities for individuals when using this procedure.

4.1 Business Group Health and Safety Leads

The BG H&S Leads are responsible for implementing this Enterprise H&S SOP for all projects in their BG. The BG HSE Lead also has the authority to approve deviation from this standard to accommodate local requirements.

4.2 Project Manager

The CH2M HILL Project Manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the H&S management process. The PM has overall H&S management responsibility, but may delegate specific tasks to other project staff. The PM retains ultimate H&S responsibility for the project.

4.3 Site Manager

The CH2M HILL Site Manager (SM) is responsible for all field operations onsite and is typically the Construction Manager (CM), Site Superintendent, Site Supervisor or Field Team Leader. The SM is directly responsible for implementing all aspects of the project H&S plan, as assigned by the PM.

4.4 Responsible Business Group Health and Safety Manager

The Responsible BG HSM (RHSM) is the HSM assigned by the BG H&S Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the CH2M HILL project H&S plan, reviews subcontractor H&S plans and submittals, conducts project H&S audits, and provides H&S support and guidance to the project.

4.5 Safety Coordinator

The Safety Coordinator (SC) is either the SM, or is designated by the SM to implement the project H&S Plan. He or she has successfully completed all required SC training. The SC ensures that the party responsible for excavation safety provides an excavation-competent person to inspect and oversee all excavation activities.

4.6 Excavation-Competent Person

The company responsible for excavation safety shall provide an excavation-competent person to inspect and oversee all excavation activities. The competent person shall have training in and knowledge of soil classification, the use of protective systems, and the requirements of local regulatory agency excavation standards. The competent person shall be capable of identifying excavation hazards and have the authority to take corrective actions to eliminate the hazards. The excavation-competent person shall be onsite during excavation activities and during entry into excavations.

4.7 CH2M HILL Employees

All employees are responsible for following safe work practices and complying with this SOP and project H&S requirements.

All employees are responsible for following the requirements established by the excavation-competent person, ensuring that the excavation-competent person has completed the daily inspection prior to entry and informing the competent person of any unsafe conditions associated with the excavation.

5.0 Requirements

The following excavation and trenching safety requirements outlined in this Enterprise SOP must be implemented.

5.1 General Requirements

CH2M HILL employees who enter excavations must take precautions to avoid excavation hazards by following the excavation entry requirements provided in Section 5.4 of this standard. CH2M HILL employees who provide oversight of subcontractor excavation activities must also follow the excavation safety requirements provided in Sections 5.5 and 5.6 of this standard. CH2M HILL employees who self-perform excavation activities must follow the excavation safety requirements provided in Sections 5.3, 5.4, 5.5 and 5.6 of this standard.

5.2 Subcontractor Management

Subcontractor H&S responsibilities are expressly defined through the subcontract terms and conditions. Subcontractors must determine how to conduct their operations, in compliance

with applicable H&S regulations and industry standards, and how to correct deficiencies. CH2M HILL employees shall not direct the means and methods of subcontractor operations.

Subcontractors are responsible and accountable for implementing these requirements and any additional requirements established in their own safety procedures. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HS&E requirements.

The "Subcontractor Safety Procedure Criteria – Excavations" presented in Attachment 1 provides the minimum criteria for excavation safety procedures. These criteria may be used by the HS&E staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of the subcontractor's operations.

The "HS&E Self-Assessment Checklist – Excavations" in Attachment 2 may be used to verify the subcontractor's compliance with established safe work practices, regulations, and industry standards.

5.3 CH2M HILL Self-performed Excavation Activities

The CH2M HILL Excavation Permit (Attachment 3) is required to be completed by the CH2M HILL excavation-competent person when CH2M HILL self-performs excavation activities. The Permit is completed and signed by the CH2M HILL excavation-competent person prior to each day's excavation activities for each excavation on the project.

The physical features of each excavation are documented in the Permit, including the length, depth, and location of the excavation. The Permit also confirms that adequate excavation protective systems have been instituted to protect workers from cave-ins, and that protective measures have been taken to control the hazards posed by surface encumbrances, underground installations, potential hazardous atmospheres, water accumulations, and stability of adjacent structures for each excavation.

An excavation permit may be extended for the same excavation for more than one day, provided there are no changes in the excavation physical features, protective systems to prevent cave-ins, or other protective measures to control the hazards posed by surface encumbrances, underground installations, potential hazardous atmospheres, water accumulations, or stability of adjacent structures.

Excavations and their adjacent areas and protective systems shall be inspected by an excavation-competent person prior to the start of each day's excavation activities, as needed throughout the work shift, and after every rainfall or other event that could increase the potential for excavation cave-in. Excavation inspections are conducted to identify evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions.

The CH2M HILL Daily Excavation Inspection Checklist (Attachment 4) is required to be completed by the CH2M HILL excavation-competent person when CH2M HILL self-performs excavation activities. The Inspection Checklist is completed and signed by the CH2M HILL excavation-competent person each day prior to entering the excavation.

5.4 Excavation Entry Requirements

The requirements of this subsection are to be followed by CH2M HILL employees and subcontractor personnel who enter excavations, regardless of the company responsible for excavation safety (CH2M HILL, subcontractor, or third party contractor).

The party responsible for excavation safety shall provide an excavation-competent person to inspect and oversee all excavation activities. CH2M HILL personnel entering an excavation controlled by a third party contractor or subcontractor must comply with the written procedures or permits governing the third party contractor's or subcontractor's excavation activities, and must document the name of the third party or subcontractor excavation-competent person in their daily log.

All personnel entering the excavation shall verify that an excavation permit has been completed prior to entry.

- Personnel shall not enter excavations until the competent person has completed the daily inspection and has authorized entry.
- Personnel entering excavations shall be aware of and follow all requirements established by the excavation-competent person.
- Personnel shall not enter excavations where protective systems are damaged or unstable unless they are responsible for excavation safety and entry must be made to repair the systems. Entry shall be made only after additional precautions have been taken to ensure safe entry, as determined by the excavation-competent person.
- Personnel shall not enter excavations where objects (including machinery) or structures above the work location might become unstable and fall into the excavation.
- Personnel shall not enter excavations where there is the potential for a hazardous atmosphere until the air has been tested and found to be at safe levels, as determined by the excavation-competent person. It is important to remember that some chemical vapors are heavier than air and can accumulate at the bottom of excavations.
- Personnel shall not enter excavations that contain accumulated water unless precautions have been taken to prevent excavation cave-in, as determined by the excavation-competent person.

5.5 Excavation Safety Requirements

The requirements of the following subsections are to be followed by CH2M HILL personnel when self-performing excavation activities, and by subcontractors when performing excavation activities while CH2M HILL provides oversight of subcontractors activities.

5.5.1 General

- A daily safety briefing/meeting shall be conducted with all excavation personnel to discuss the work planned for the day and the HS&E requirements to be followed.

- Excavations that are to be entered shall be inspected each day, as needed throughout the work shift, and after every rainfall or other event that could increase the potential for excavation cave-in. This inspection shall be conducted by the excavation-competent person and shall include, at a minimum, indications of possible cave-in, water accumulation, failure of any component of protective systems, stability of spoil piles and adjacent structures, and indications of hazardous atmosphere. Subcontractors shall document their daily excavation inspections using their excavation inspection checklist.
- If the excavation-competent person observes any deficiency or unsafe condition, excavation entry will not be permitted and all exposed personnel shall be removed from the excavation until adequate precautions have been taken to ensure safe entry.
- Walkways shall be provided where personnel are required or permitted to cross over excavations. Walkways 6 feet (1.8 m) or more above lower levels shall be equipped with standard guardrails.
- Guardrails, fences, or barricades shall be installed at excavations 6 feet (1.8 m) or deeper when the excavations are not readily visible because of plant growth or other visual obstruction.
- Wells, pits, shafts and similar excavations 6 feet (1.8 m) or deeper shall be provided with guardrails, fences, barricades or covers.
- Earthmoving equipment shall be operated in compliance with local regulatory agency requirements.

5.5.2 Prior to Excavating

- A Dig Permit may be required at certain client facilities.
- Excavation activities that are performed on sites with known or potential unexploded ordinance (UXO) must implement additional excavation precautions as described in HSE-610, *Explosive Usage and Munitions Response*.
- Soils suspected to be contaminated should be sampled and analyzed for characterization prior to excavation as described in HSE-408, *Waste Management: Analysis and Characterization*.
- Stockpiles *may require liners and covers* and excavations may require silt fences, covering, or other best management practices (BMPs) to control erosion or runoff.
- The location of underground utilities such as electric, gas, fuel, water, cable, telephone, and sewer, either in service or abandoned, and underground installations such as foundations, underground storage tanks, and any other structures shall be identified before excavating is permitted. Utility companies and/or installation owners shall be contacted for exact locations of their equipment. When the exact location cannot be determined, detection equipment or other acceptable means of locating the underground installations shall be used before excavation.

5.5.3 Excavating Activities

- All rocks, trees, and other surface encumbrances that are undermined or could become unstable as a result of excavating activities shall be removed or supported to prevent them from falling into the excavation.
- Fugitive dust and noise must be monitored and suppressed where necessary.

- Support systems such as shoring, bracing, or underpinning shall be used to support exposed underground utilities that may become unstable as a result of excavating operations.
- Excavating below the base of a foundation, wall, sidewalk or other surface structure shall not be permitted unless: 1) a support system is provided to ensure the stability of the structure, 2) the excavation is in stable rock, or 3) a registered professional engineer has determined that the structure is far enough away that it will not be affected by the excavating activity.
- When mobile equipment is required to approach the edge of an excavation and the operator does not have a clear and direct view of the edge, warning systems such as barricades, hand and/or mechanical signals, or stop logs shall be in place to remind the operator of the location of the edge.

5.5.4 Excavation Entry

- Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).
- Structural ramps used solely by personnel shall be designed by a competent person. Structural ramps used by equipment shall be designed by a competent person qualified in structural design (generally a registered professional engineer).
- The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.
- When atmospheric testing indicates a hazardous atmosphere exists or could reasonably be expected to exist, emergency rescue equipment such as safety harnesses and lifelines and emergency self-contained breathing apparatus (SCBA) shall be readily available.
- When atmospheric testing indicates that a hazardous atmosphere is present, ventilation or appropriate respiratory protection shall be used to eliminate or reduce exposure to safe levels. If ventilation is used, atmospheric testing shall be conducted as often as necessary to ensure safe levels are maintained.
- Excavations that contain accumulated water shall not be entered unless precautions have been taken to prevent excavation undermining and cave-ins. Precautions may include special support systems or shield systems, water removal equipment that is monitored by the excavation-competent person to ensure proper operation, or safety harnesses and lifelines.
- Adequate precautions such as diversion ditches or dikes shall be used to prevent surface water from entering the excavation, and to provide adequate drainage of the area adjacent to the excavation when the natural drainage of surface water is interrupted.
- Personnel shall be protected from materials falling or rolling from the face of the excavation by scaling to remove loose material, or by installing protective barricades.
- Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.

5.5.5 Protective Systems

The excavation-competent person is responsible for determining the appropriate protective system to be used to prevent excavation cave-in. This determination may be based on the soil classification, space limitations, available materials, type of work to be performed in the excavation, and availability of tabulated data or a registered professional engineer.

CH2M HILL must rely on the expertise of the excavation-competent person with regard to excavation protective systems. The following information provides a general understanding of the common minimum protective system requirements. For the U.S., refer to “OSHA Protective System Requirements Summary” in Attachment 5. For other countries, refer to the country-specific SOP or local regulatory agency requirements.

- Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet (1.5 meters) deep and there is no indication of possible cave-in, as determined by the excavation-competent person.
- Excavations that are less than 5 feet in depth where examination of the ground by a competent person provides any indication of a potential cave-in shall be sloped to 34 degrees.
- Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.
- If the excavation soil is not classified by the excavation-competent person, the maximum allowable slope shall be 34 degrees measured from the horizontal. Refer to 5.7 for details about the actual slope and configurations allowed.
- Protective system materials shall be free from damage that might impair their proper function. Damaged components shall be inspected by the competent person to evaluate their suitability for continued use.
- Protective system materials shall be used in a manner consistent with manufacturers’ recommendations and shall not be subjected to loads exceeding their design limits.
- Protective system materials shall be securely connected together to prevent sliding, falling, kickouts or other predictable failures.
- Personnel shall be protected from cave-ins while entering and exiting shielding systems.
- Personnel shall not work in shielding systems during installation, removal, or vertical movement. Personnel may remain inside the shield during horizontal movement as long as the shield is not lifted.

5.5.6 Protective Systems Removal and Backfilling

- Precautions shall be taken when removing protective system components. Removal shall start at, and progress from, the bottom of the excavation. Components shall be released slowly so that it is possible to detect indications of possible failure of the remaining components. Temporary structural members may be required to carry the loads imposed on the protective system.
- Backfilling shall take place immediately after removal of the protective system.

6.0 Training Requirements

CH2M HILL employees who enter excavations, regardless of the company responsible for excavation safety, are required to complete either the CH2M HILL 10-Hour Construction Safety Awareness training course or the Excavation computer-based training module found on the HS&E web page.

CH2M HILL may choose to supplement internal construction training courses with courses provided by local regulatory agencies.

When CH2M HILL self-performs excavation activities, the CH2M HILL excavation-competent person is required to complete a separate excavation-competent person course.

Excavation subcontractors are responsible for complying with all applicable HS&E training requirements and for providing the training necessary to complete their tasks safely.

7.0 Assessment Requirements

The “HS&E Self-Assessment Checklist – Excavations” in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM may use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor’s activities.

8.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria – Excavations](#)



Attachment 2 [HS&E Self-Assessment Checklist – Excavations](#)

Attachment 3 [CH2M HILL Excavation Permit](#)

Attachment 4 [CH2M HILL Daily Excavation Inspection Checklist](#)

Attachment 5: [OSHA Protective System Requirements Summary](#)

9.0 Revision Log

Revision	Date	Description	Prepared by	Approved by
1	09/05/2005	Updated to Standard Operating Procedure	Angelo Liberatore and Mark Fagan	
2	03/30/2010	Updated Applicable SOPs and requirements in Sections 5.5.3 and Section 5.5.4	Angelo Liberatore/ Jeff Stumpf	

Attachment 1: Subcontractor Safety Procedure Criteria—Excavations

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor safety procedures. Subcontractors are expected to address the following items in their safety procedures:

Minimum Acceptable Criteria for Subcontractor Excavation Safety Procedures:

1. Provide name and qualifications of the “competent person” responsible for excavation activities (for example, years and type of experience, training background):
2. Describe excavation and protective system inspection criteria or procedures (for example, frequency of inspections – daily, as needed throughout day, after rain; visual versus written inspections, items that are inspected):
3. Describe methods of identifying underground utilities (for example, contacting utility companies, detection equipment):
4. Describe specific method(s) of cave-in protection to be used on project (for example, sloping, benching, shoring, shielding):
5. Describe option(s) that will be used for protective systems determination (for example, soil classification, tabulated data, other data, registered professional engineer design):
6. Describe methods used to identify hazardous atmospheres and controls (for example , detection equipment, ventilation, respiratory protection, rescue equipment):
7. Describe methods used to prevent water accumulation (for example , water removal equipment, special support systems, harnesses and lifelines):
8. Describe methods used to protect workers from material falling into the excavation (for example , remove or support objects, keep material 2 feet (61 cm) back from edge of excavation, or keep workers off slopes):
9. Describe methods used to support adjacent structures near excavations (for example , shoring, bracing, or underpinning):
10. Describe safe work practices for other activities to be performed during this project [for example , use of ladders, fall protection, personal protective equipment (PPE)]:
1. Provide summary of equipment that will be needed to perform excavation safely and verify that equipment is in good operational condition (for example , excavation digging equipment, shoring and shielding materials):



Attachment 2: HS&E Self-Assessment Checklist—Excavations Page 1 of 3

This checklist shall be used by CH2M HILL personnel only and shall be completed at the frequency specified in the project's Health and Safety Plan/Field Safety Instruction (HSP/FSI).

This checklist is to be used at locations where: 1) CH2M HILL employees enter excavations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of an excavation subcontractor is required (complete entire checklist).

The SC may consult with excavation subcontractors when completing this checklist, but shall not direct the means and methods of excavation operations nor direct the details of corrective actions. Excavation subcontractors shall determine how to correct deficiencies and we must rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until the situation is corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL employee exposures to excavation hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with excavation HS&E requirements
Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1

Yes No N/A N/O

EXCAVATION ENTRY REQUIREMENTS (4.1)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel have completed excavation safety training | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Competent person has completed daily inspection and has authorized entry | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Personnel are aware of entry requirements established by competent person | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Protective systems are free from damage and in stable condition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Surface objects/structures secured from falling into excavation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Potential hazardous atmospheres have been tested and found to be at safe levels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Precautions have been taken to prevent cave-in from water accumulation in the excavation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Personnel wearing appropriate, PPE per HSP/SI | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
<u>SECTION 2</u>				
GENERAL (4.2.1)				
9. Daily safety briefing/meeting conducted with personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Excavation and protective systems adequately inspected by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Defective protective systems or other unsafe conditions corrected before entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Guardrails provided on walkways over excavation 6 ft (1.8m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Barriers provided at excavations 6 ft or deeper when excavation not readily visible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Barriers or covers provided for wells, pits, shafts, or similar excavation 6 ft (1.8 m) or deeper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Earthmoving equipment operated safely (use earthmoving equipment checklist in HSE-306)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PRIOR TO EXCAVATING (4.2.2)				
16. Dig Permit obtained where required by client/facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Location of underground utilities and installations identified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATING ACTIVITIES (4.2.3)				
26. Rocks, trees, and other unstable surface objects removed or supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Exposed underground utility lines supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Undermined surface structures supported or determined to be in safe condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Warning system used to remind equipment operators of excavation edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATION ENTRY (4.2.4)				
32. Trenches > 4 ft (1.2 m) deep provided with safe means of egress within 25 ft (7.6 m)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Structure ramps designed and approved by competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Potential hazardous atmospheres tested prior to entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Rescue equipment provided where potential for hazardous atmosphere exists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Ventilation used to control hazardous atmosphere and air tested frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Appropriate respiratory protection used when ventilation does not control hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Precautions taken to prevent cave-in resulting from water accumulation in excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Precautions taken to prevent surface water from entering excavation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Protection provided from falling/rolling material originating from excavation face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Spoil piles, equipment, materials restrained or kept at least 2 ft (61 cm) from excavation edge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXCAVATION PROTECTIVE SYSTEMS (4.2.5)				
42. Protective systems used for excavations 5 ft (1.5 m) or deeper, unless in stable rock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Protective systems for excavation deeper than 20 ft (6.1 m) designed by registered PE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. If soil unclassified, maximum allowable slope is 34 degrees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Protective systems free from damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Protective system used according to manufacturer's recommendations and not subjected to loads exceeding design limits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Protective system components securely connected to prevent movement or failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Cave-in protection provided while entering/exiting shielding systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Personnel removed from shielding systems when installed, removed, or if vertical movement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROTECTIVE SYSTEM REMOVAL AND BACKFILLING (4.2.6)				
50. Protective system removal starts and progresses from excavation bottom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Protective systems removed slowly and cautiously	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Temporary structure supports used if failure of remaining components observed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Backfilling takes place immediately after protective system removal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

Project Manager: _____



Attachment 3: CH2M HILL Excavation Permit

EXCAVATION PERMIT

This Permit is required to be completed by the CH2M HILL excavation-competent person when CH2M HILL self-performs excavation activities. The Permit is completed and signed by the CH2M HILL excavation-competent person prior to each day's planned excavation activities for each excavation on the project.

This Permit may be extended for the same excavation for more than one day, provided there are no changes in the excavation's physical features, protective systems to prevent cave-ins, or other protective measures to control the hazards posed by surface encumbrances, underground installations, potential hazardous atmospheres, water accumulations, or stability of adjacent structures.

GENERAL INFORMATION

Date: _____ Time: _____ Date Expires: _____

Project/Site Name: _____ Project Number: _____

Location of Excavation: _____

Scope of Work Description: _____

Size of Excavation: Depth: _____ Width: _____ Length: _____

PRIOR TO EXCAVATING

- ☐ Dig Permit obtained, where required by client/facility
- ☐ Client, installation owners, and utility companies contacted for location of underground utilities
- ☐ Detection equipment used when exact location of underground utilities is unknown
- ☐ Underground utilities located **within 5 feet** of excavations are hand-excavated to determine their exact location

The above data have been checked with drawing on file. When underground utilities are located within 5 feet of excavations, hand-excavation must be used to determine the exact location of buried utilities. Existing lines and interferences in the vicinity of work must be marked by stakes indicating the location and depth before excavating.

LINES IN THE VICINITY OF WORK

Electrical _____ Sewer _____ Drain _____ Other _____

Telephone _____ Steam _____ Process _____ (Specify) _____

Water _____ Alarm _____ Fiber Optic _____ Gas _____

PRECAUTIONS TAKEN

De-Energize Line _____ Insulate Operator _____

Ground Tools _____ Hand-excavate _____

ACCESS AND EGRESS

Ladder(s) _____ Ramp _____ Stairs _____

SOIL CLASSIFICATION

- ☐ Soils to be excavated have been classified: ☐ Stable Rock ☐ Type A ☐ Type B ☐ Type C
☐ Combination, describe: _____

NOTE: If soils unclassified, assume to be Type C

Soil Classification Basis (one visual and one manual test required):

- ☐ Visual Test ☐ Manual Test ☐ Pocket Penetrometer

EXCAVATING

- ☐ Rocks, trees, and other unstable surface encumbrances located that present a hazard to employees are removed or supported when required
☐ Underground utilities protected, supported, or removed to safeguard employees
☐ Undermined surface structures supported or determined to be in safe condition
☐ Warning system used to remind equipment operators of excavation edge

HAZARDOUS ATMOSPHERES

Is there a concern for developing a hazardous atmosphere? Yes _____ No _____

WATER ACCUMULATIONS

Is protection from the hazards associated with water accumulation required? Yes _____ No _____
Excavation interrupts drainage from surface water? Yes _____ No _____

PROTECTIVE SYSTEMS

- ☐ Protective systems used for excavations 5 ft (1.5 m) or deeper, unless stable rock
☐ Protective systems for excavation deeper than 20 ft (6.1 m) designed by registered PE
☐ Protective systems used: ☐ Sloping/Benching ☐ Shoring ☐ Trench Box ☐ Combination
Describe: _____

NOTE: No Benching allowed for Type C soil.

- ☐ Sloping cut to appropriate angle of incline for soil classification (if unclassified, assume Type C soil)
☐ Shoring/trench boxes used according to manufacturer recommendations and not subjected to loads exceeding design limits
☐ Protective system components securely connected to prevent movement or failure
☐ Protective systems inspected before installed
☐ Defective protective systems replaced or corrected

CH2M HILL Excavation-competent Person Name: _____

CH2M HILL Excavation-competent Person Signature: _____



Attachment 4: CH2M HILL Daily Excavation Inspection Checklist

DAILY EXCAVATION INSPECTION CHECKLIST

Excavations, their adjacent areas, and their protective systems shall be inspected by an excavation-competent person prior to the start of each day's excavation activities, as needed throughout the work shift, and after every rainfall or other event that could increase the potential for excavation cave-in. This Inspection Checklist is required to be completed by the CH2M HILL excavation-competent person when CH2M HILL self-performs excavation activities. The Inspection Checklist is completed and signed by the CH2M HILL excavation-competent person prior to each day's entry into the excavation.

GENERAL INFORMATION

Date: _____ Time: _____ Weather _____

Conditions: _____

Project/Site Name: _____ Project Number: _____

Name/Location of Excavation: _____

Scope of Work Description: _____

INSPECTION CHECKLIST

- ☐ Excavation effectively barricaded to prevent unauthorized entry
- ☐ Barriers provided at excavations 6 ft or deeper when not readily visible
- ☐ Guardrails provided on walkways over excavations 6 ft or deeper
- ☐ Underground utilities protected, supported, or removed to safeguard employees
- ☐ Adjacent structures are adequately supported
- ☐ No tension cracks/fractures or evidence of caving, sloughing, or weak zones observed in soil
- ☐ Precautions taken to prevent surface water from entering excavation
- ☐ Water is not accumulating in excavation
- ☐ When water removal equipment used, it is monitored for proper operation
- ☐ Air monitoring conducted for excavations with hazardous atmosphere potential
- ☐ If hazardous atmosphere, ventilation used to bring conditions to safe level and tested frequently
- ☐ If ventilation unable to bring conditions to safe level, appropriate respiratory protection used
- ☐ Rescue equipment provided where potential for hazardous atmosphere exists
- ☐ Protective systems provided to prevent excavation cave-in
- ☐ Protective systems used: ☐ Benching ☐ Sloping ☐ Shoring ☐ Trench Box ☐

Combination

Describe: _____

- ☐ Protective systems inspected and are free from damage and in stable condition
- ☐ Protective system components securely connected to prevent movement or failure
- ☐ Sloping cut to appropriate angle of incline for soil classification
- ☐ Shoring installed according to design and secured from movement
- ☐ Hydraulic shores maintained at designed pressure
- ☐ Trench boxes not subjected to loads exceeding design limits
- ☐ Vehicular traffic diverted an adequate distance from excavation

- ☐ Spoil piles, equipment, and materials restrained or kept at least 2 ft (61 cm) from excavation edge
- ☐ Protection provided to prevent material from falling/rolling into excavation
- ☐ Safe means of egress provided every 25 ft (7.6 m) inside excavation
- ☐ Personnel entering excavation briefed and understand planned work and safety precautions
- ☐ Additional precautions taken when entering excavation to repair damaged or unstable protective systems

CH2M HILL Excavation-competent Person Name:

CH2M HILL Excavation-competent Person Signature:

Attachment 5: OSHA Protective System Requirements Summary

Sloping and Benching Systems

Sloping and benching systems must be designed by a registered professional engineer for excavations deeper than 20 feet (6.1 meters). System design for excavations 20 feet (6.1 meters) or less in depth must be selected and constructed by using one or more of the following options:

Option 1: Soil classification not required. Maximum allowable slope = 1-½ horizontal (H) to 1 vertical (V) or 34 degrees measured from the horizontal. Acceptable configurations are determined in accordance with Appendix B, Figure B-1.3 of OSHA 29 CFR 1926 Subpart P.

Option 2: Maximum allowable slope based on the soil classification type. A competent person must classify the soil as Stable Rock, Type A, Type B, or Type C soil based on at least one visual and at least one manual analysis. Acceptable test methods are outlined in Appendix A of CFR 1926 Subpart P. Acceptable configurations are determined in accordance with Appendix B, Figure B-1 of CFR 1926 Subpart P. The following table provides the maximum allowable slope based on soil classification.

Soil Type	Maximum Allowable Slope (H:V)
Stable Rock	Vertical (90 degrees)
Type A	¾ : 1 (53 degrees)
Type A – open less than 24 hours and 12' (3.7 m) or less deep	½ : 1 (63 degrees)
Type B	1: 1 (45 degrees)
Type C	1-½: 1 (34 degrees)

Option 3: Maximum allowable slope based on other tabulated data, such as tables and charts. The identity of the approving registered professional engineer must be stamped on the data. The tabulated data must be in written form, describing detailed information on its use and limitations, and must be at the job site during construction of the protective system.

Option 4: Sloping or benching designs prepared and approved by a registered professional engineer. The identity of the registered professional engineer who approved the data must be stamped on the design. The design must identify the project and the configurations must be determined safe for the project. The design documents must be at the job site during construction of the protective system.

Notes: Options 1 and 2:

- The actual slope shall not be steeper than the maximum allowable slope.
- When the excavation shows signs of distress, the actual slope shall be reduced from the maximum allowable slope by $\frac{1}{2}$ horizontal and 1 vertical ($\frac{1}{2}H:1V$).
- When surcharge loads from operating equipment, traffic, stored material, and equipment are present, the competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope.

Shoring, Shielding, and Other Protective Systems

Shoring, shielding, and other protective systems must be selected and constructed by using one of the following options. Soil classification using Appendix A of OSHA 29 CFR 1926 Subpart P is required for each option.

Option 1: Timber shoring design determined in accordance with the conditions and requirements of Appendix C of OSHA 29 CFR 1926 Subpart P. Aluminum hydraulic shoring design determined in accordance with Option 2, unless the manufacturer's tabulated data cannot be used. In such cases, Appendix D of OSHA 29 CFR 1926 Subpart P shall be followed. This option may be used only for excavations 20 feet or less in depth.

Option 2: Designs for protective systems determined in accordance with the specifications, recommendations, and limitations of the manufacturer's tabulated data. The manufacturer must issue written approval to deviate from these requirements and the approval must be available at the job site.

Option 3: Protective system designs determined using other tabulated data, such as tables and charts. The identity of the approving registered professional engineer must be stamped on the data. The tabulated data must be in written form, describing detailed information on its use and limitations, and must be at the job site during construction of the protective system.

Option 4: Protective system designs prepared and approved by a registered professional engineer. The identity of the registered professional engineer who approved the data must be stamped on the design. The design must identify the project and the configurations must be determined safe for the project. The design must be in written form, describing detailed information on its use and limitations, and must be at the job site during construction of the protective system.

Lockout/Tagout

Enterprise Standard Operating Procedure HSE-310

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups must comply, when performing Lockout/Tagout activities.

2.0 Scope and Application

2.1 Scope

Lockout/tagout procedures shall be established and followed before servicing and maintenance activities are performed on equipment that could cause injury to personnel from the unexpected equipment energization or start-up or unexpected release of stored energy. Hazardous energy sources to be considered are kinetic (mechanical) energy in the form of moving parts of mechanical systems; potential energy stored in pressure vessels, gas tanks, hydraulic or pneumatic systems, and springs; electrical energy from generated electrical power, static sources, or electrical-storage devices (such as batteries or capacitors); and thermal energy (high or low temperature) resulting from mechanical work, radiation, chemical reaction, or electrical resistance.

Lockout/tagout procedures are not required for the following activities:

- Work on cord- and plug-connected electric equipment in which exposure to the hazards of unexpected equipment energization or start-up is controlled by unplugging the equipment from the energy source and by placing exclusive control of the plug under the employee servicing or maintaining the equipment.
- Normal production operations unless personnel are required to remove or bypass a guard or other safety device or are required to place any part of their body into an area where work is being performed on the material during the process (point of operation) or where an associated danger zone exists during a equipment operating cycle.
- Minor tool changes and adjustments, and other minor servicing activities, that take place during normal production operations, if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures that provide effective protection.

This SOP does not address working on energized electrical circuits that are not protected by Lockout/Tagout procedures; this activity is addressed in the HSE-221, *Energized Electrical Safety*.

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some State Occupational Safety and Health (OSHA) plans may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (HSM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health and safety (H&S) regulations (that is, Canada or Australia) shall prevail, and a country-specific SOP should be developed to comply with these specific H&S regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are potentially exposed to the hazards associated with Lockout/Tagout activities, regardless of the company responsible for these activities (CH2M HILL, subcontractor or third party contractor)
- CH2M HILL employees perform lockout/tagout activities; and/or,
- CH2M HILL provides oversight of subcontractor's Lockout/Tagout activities.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to Lockout/Tagout activities:

- [HSE-206 - Electrical Safety](#)
- [HSE-221 - Energized Electrical Safety](#)

3.0 Definitions

3.1 Affected Employee

An affected employee uses equipment on which servicing or maintenance is being performed under lockout/tagout procedures or who works in an area in which servicing or maintenance is being performed.

3.2 Authorized Employee

An authorized employee performs servicing or maintenance on equipment and who applies lockout devices and tags for the purpose of isolating the equipment energy sources.

3.3 Energy Isolating Device

An energy isolating device is a mechanical device that physically prevents the transmission or release of energy and includes, but is not limited to the following: manually operated electrical circuit breakers, disconnect switches, manually operated switches by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, line valves, blocks, and any similar devices used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not considered energy isolating devices.

3.4 Hazardous Energy

Hazardous energy sources include the following:

- Mechanical energy in the form of moving parts of mechanical systems
- Potential energy stored in pressure vessels, gas tanks, hydraulic or pneumatic systems, and springs
- Electrical energy from generated electrical power, static sources, or electrical-storage devices (such as batteries or capacitors)
- Thermal energy (high or low temperature) resulting from mechanical work, radiation, chemical reaction, or electrical resistance.

3.5 Lockout

A lockout involves placing a lockout device on an energy isolating device to ensure that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

3.6 Lockout Device

A lockout device is a device that uses a positive means, such as a lock, to hold an energy isolating device in the safe position and prevent the equipment energization.

3.7 Servicing and Maintenance Activities

Activities such as constructing, installing, setting up, adjusting, inspecting, and modifying are considered servicing and maintenance activities. Specific servicing and maintenance activities include lubricating, cleaning, or unjamming equipment and adjusting or changing tools where employees may be exposed to the unexpected start-up or energization or release of hazardous energy.

3.8 Tagout

A tagout involves placing a lockout danger tag on an energy isolating device to indicate that the energy isolating device and the equipment being controlled may not be operated until the tag is removed.

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the SM, or is designated by the SM to implement the project H&S Plan and who has successfully completed all required SC training. The SC trains CH2M HILL employees exposed to the hazards posed by Lockout/Tagout activities, in hazard awareness and control procedures, as detailed in the site-specific health and safety plan. The SC also oversees subcontractor's Lockout/Tagout activities.

4.2 Authorized Employee

The authorized employee is responsible implementing these Lockout/Tagout procedures. The SC serves as the authorized employee when CH2M HILL employees perform Lockout/Tagout Activities.

4.3 Responsible Health and Safety Manager

The Responsible Health and Safety Manager (RHSM) provides ongoing health and safety technical guidance and support to the project, program or facility for the BG within the RHSM's assigned area of responsibility. The RHSM approves the HILL project Field Safety Instruction or Health and Safety plan and amendments to those plans, while designating competent/authorized/qualified persons.

The RHSM conducts project HS audits and providing HS support and guidance to the project or facility. During these periodic audits, inspection of the energy control procedure will be conducted at least annually to ensure that the procedure is being followed. The audit report shall be documented, in accordance with the HSE Auditing procedures in HSE 109, with any corrective actions identified to address compliance with this procedure.

5.0 Requirements

The following Lockout/Tagout requirements outlined in this Enterprise SOP must be implemented.

All CH2M HILL employees and subcontractors who perform lockout/tagout activities (including construction activities) shall comply with the General Industry Lockout/Tagout Standard, which requires employers to establish and implement a written energy control program when employees are required to perform lockout/tagout activities. This SOP serves as CH2M HILL's written energy control program and complies with the requirements of the General Industry Standard.

5.1 Safe Work Practices

These safe work practices are to be followed by CH2M HILL employees who work on or adjacent to equipment requiring lockout/tagout protection, regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

- Only authorized employees may lockout or tag equipment to perform servicing or maintenance activities.
- All affected employees are notified that servicing and maintenance is required and that the equipment must be shut down and locked out to perform servicing and maintenance.
- Normal equipment shutdown procedures shall be used when employees are notified that the equipment they are using requires servicing or maintenance.
- Employees shall not attempt to start, energize, or use equipment that has been locked or tagged out until the authorized employee informs them that all locks and tags have been removed and servicing and maintenance activities have been completed.

- Conductors and parts of electrical equipment that have been deenergized but not been locked or tagged out shall be treated as live parts.
- Employees shall not remove locks or tags placed on equipment by other employees.
- Employees shall verify that all safe guards have been put back in place before the equipment is restarted.

5.2 Lockout/Tagout Safety Requirements

These requirements apply when CH2M HILL is overseeing subcontractor's lockout/tagout activities and self-performing these activities.

5.2.1 General

- A daily safety briefing/meeting shall be conducted with all affected and authorized employees to discuss the lockout/tagout activities planned for the day and the HSE requirements to be followed.
- Authorized and affected employees shall be made aware of any equipment-specific lockout/tagout procedures being used at the facility.
- Authorized employees shall be provided with lockout devices, locks, tags, and other hardware for isolating, securing, or blocking equipment from energy sources.
- When new equipment is installed or when existing equipment is replaced, renovated, modified, or undergoing major repair, the equipment shall be designed or modified to accept a lockout device

5.2.2 Equipment-Specific Lockout/Tagout Procedures

When available from the facility or equipment owner, equipment-specific lockout/tagout procedures shall be followed. When equipment-specific lockout/tagout procedures are not available, or when the existing procedures are determined to be insufficient (such as not addressing all energy sources), then the authorized employee shall be required to develop a procedure specific to the equipment being serviced. CH2M HILL authorized employees shall complete Attachment 3, Equipment-Specific Lockout/Tagout Procedure Development Form, to create an equipment-specific lockout/tagout procedure when required.

Lockout/tagout procedures shall be followed before servicing and maintenance activities are performed on equipment that could cause injury to personnel from the unexpected energization or start-up of the equipment or unexpected release of stored energy.

Lockout/tagout procedures are not required under the following conditions:

- Equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown that could endanger personnel
- Equipment has a single energy source that can be readily identified and isolated
- The isolation and locking out of that energy source will completely de-energize and deactivate the equipment
- Equipment is isolated from that energy source and locked out during servicing and maintenance activities
- A single lockout device will achieve a locked-out condition

- The lockout device is under the exclusive control of the authorized employee performing the servicing and maintenance activity
- The servicing and maintenance does not create hazards for other personnel

5.2.3 Standard Lockout/Tagout Steps

All lockout/tagout procedures shall contain the following steps and be performed in the following sequence:

1. **Notification of affected employees:** Authorized employees shall notify all affected employees that servicing and maintenance is required and that the equipment must be shut down and locked out to perform servicing and maintenance.
2. **Preparation for shutdown:** Authorized employees shall have knowledge of the type and magnitude of all energy sources, the hazards of the energy, and the means of controlling the energy before the equipment is shutdown.
3. **Equipment shutdown:** The equipment shall be shut down using the normal procedures established for the equipment. An orderly shutdown must be used to avoid any additional or increased hazard(s) to employees as a result of shutting down the equipment.
4. **Equipment isolation:** All energy isolating devices that are needed to control the energy to the equipment shall be physically located and operated so that the equipment is isolated from the energy source(s).
5. **Application of lockout devices and tags:** Each authorized employee shall apply their personal lockout device and/or tag to each energy isolating device. Lockout devices and tags shall meet the requirements provided in Section 5.5.4 of this SOP.

Lockout devices shall be applied to equipment capable of being locked out so that the energy isolating devices are held in a “safe” or “off” position unless it can be demonstrated that using lockout tags will provide equal protection to that of a lockout device. In demonstrating equivalent protection, additional safety measures shall be implemented, such as removing an isolating circuit element, blocking a controlling switch, opening an extra disconnecting device, or removing a valve handle to reduce the likelihood of inadvertent energization.

Equipment not capable of being locked out shall be protected by lockout tags. Lockout tags shall be applied so that it is indicated that operating or moving energy isolating devices from the “safe” or “off” position is prohibited. The lockout tag shall be attached at the same location that the lockout device would have been attached. When lockout tags cannot be applied directly to the energy isolating device, the tags shall be located as close as safely possible to the energy isolating device in a position that will be immediately obvious to anyone attempting to operate the device.

6. **Release of stored energy:** Once the lockout devices and tags have been applied, all potentially hazardous stored or residual energy shall be relieved, disconnected, or restrained. If there is a possibility that stored energy will reaccumulate to a hazardous level, then isolation shall be verified until servicing and maintenance are complete.
7. **Verification of isolation:** Before equipment servicing and maintenance begins, the authorized employee shall verify that isolation and deenergization of the equipment has been completed. This shall be accomplished by trying to operate the equipment

using normal operating control(s) or by testing to make certain the equipment will not operate. Control(s) shall be returned to the neutral or "off" position after verifying the isolation of the equipment.

Only a properly rated and calibrated Volt/Ohm meter shall be used to measure the electrical load and current for not only confirming zero energy state as part of the Lockout/Tagout process.

NOTE: The use of voltage proximity testers, commonly known as "Tic-Tracers" are strictly prohibited for use as diagnostic devices for confirming zero energy state for Lockout/Tagout or diagnosing energized electrical circuits.

5.2.4 Lockout Devices and Tags

Lockout devices and tags shall meet the following requirements:

- Lockout devices and tags shall be the only devices used for controlling energy; they shall not be used for other purposes.
- Lockout devices and tags shall be standardized on the project in at least one of the following criteria: color, shape, or size; additionally, in the case of tags, print and format shall be standardized.
- Lockout devices and tags shall indicate the identity of the employee applying the device(s).
- Lockout devices and tags shall be capable of withstanding the environment to which they are exposed for the maximum expected exposure time.
- Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal-cutting tools.
- Tags and their means of attachment shall be substantial enough to prevent inadvertent or accidental removal. The means of attachment shall be of a nonreusable type, attachable by hand, self-locking, and nonreleasable, with a minimum unlocking strength of no less than 50 pounds.
- Tags shall be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
- Tags shall warn against hazardous conditions if the equipment is energized and shall include a legend such as the following: Do Not Start, Do Not Open, Do Not Close, Do Not Energize, or Do Not Operate.

5.2.5 Releasing Lockout/Tagout Control

Before lockout devices and tags are removed and energy is restored to the equipment, the work area shall be inspected to ensure that all personnel are in a safe position, all nonessential items have been removed, and equipment components are operationally intact, including the proper reattachment of all equipment safe guards.

Each lockout device and tag shall be removed from each energy isolating device by the authorized employee who applied the devices. If an authorized employee fails to remove

his/her device and he/she has left the facility, then the following steps shall be followed for the removal of his/her lockout device and tag (indiscriminate use of bolt cutters is not an acceptable practice):

- Verify that the authorized employee who applied the device is not at the facility.
- Make all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout device and tag will be removed. If the employee cannot be contacted (documentation of contact efforts must be completed), then the lockout device and tag may only be removed by the on-site project lead after verifying that work is completed and that the equipment has been returned to normal operating conditions.
- Ensure that the authorized employee is informed that his/her lockout device and tag has been removed before he/she resumes work at the facility. The employee's direct supervisor shall be responsible for this action.

All affected employees shall be notified that the lockout devices and tags have been removed before starting the equipment.

5.2.6 Group Lockout/Tagout

When servicing and maintenance activities are to be performed by more than one authorized employee, a primary authorized employee shall be identified and a group lockout/tagout process shall be used that provides each authorized employee a level of protection equivalent to the implementation of a personal lockout/tagout device. The primary authorized employee shall have overall responsibility for the group lockout/tagout and shall coordinate the application of personal locks/tags to ensure that group lockout/tagout protection is maintained until the work is completed.

- The primary authorized employee shall initiate group lockout/tagout control by completing the same steps as provided in Section 4.2.2 of this SOP, including applying his/her own personal lock/tag to a group lockout device.
- Each authorized employee shall apply his/her personal lock/tag to the group lockout/tagout device when he/she begins work and shall remove his/her lock/tag after their work is completed.
- Each authorized employee may verify the effectiveness of the lockout/tagout control measures by personally confirming that all hazardous energy sources have been effectively isolated, if he/she so chooses. This verification must be performed after applying his/her personal lock/tag to the group lockout device and before performing servicing and maintenance activities.
- The primary authorized employee shall remove his/her lock/tag from the group lockout device only when all authorized employees have removed their lock/tags and all affected employees have been notified.

5.2.7 Special Conditions

Shift or personnel changes made during servicing and maintenance activities shall be coordinated to ensure that lockout/tagout protection is always provided, including the orderly transfer of lockout devices and tags between off-going and oncoming authorized employees.

In situations where lockout devices and tags must be temporarily removed from the energy isolating device and the equipment energized to test or reposition the equipment or components, the following sequence shall be followed:

- Clear equipment of tools and materials, and remove all employees from the equipment area
- Remove only the lockout devices and tags needed to energize the equipment for testing or repositioning
- Energize and proceed with testing or repositioning
- De-energize the equipment, and reapply the lockout devices and tags to continue the servicing and maintenance activities.

5.3 Subcontractor HSE Oversight

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HSE regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

The "Subcontractor Safety Procedure Criteria – Lockout/Tagout" presented in Attachment 1 provides the minimum criteria for subcontractor safety procedures. These criteria may be used by the HSE staff to review submitted subcontractor procedures when CH2M HILL is performing oversight of subcontractor's operations.

When the subcontractor is in control of Lockout/Tagout activities, the subcontractor shall provide an authorized employee that will oversee all these activities.

5.4 CH2M HILL Self-Perform Requirements

When CH2M HILL is in control of Lockout/Tagout activities, CH2M HILL shall provide an authorized employee that will oversee all these activities.

6.0 Training Requirements

6.1 Affected Employees

Affected employees shall be informed of the use of lockout/tagout procedures and shall be instructed not to restart or reenergize equipment that is locked or tagged out. The authorized employee performing the lockout/tagout is responsible for informing all affected employees.

6.2 Authorized Employees

CH2M HILL authorized employees are required to complete the Lockout/Tagout computer-based training module found on the HSE web page, and training on this SOP by the safety coordinator as it applies on the CH2M HILL project or facility. Retraining is required when there is a change in job assignments, in equipment or machines, a change in the energy control procedures, or a new hazard is introduced.

When performing servicing and maintenance activities on electrical equipment, CH2M HILL authorized employees are also required to complete either the General Electrical Safety

computer-based training module found on the HSE web page or the 10-Hour Construction Safety Awareness training course that contains a electrical safety training section

Subcontractors are responsible for complying with all applicable HSE training requirements and for providing the training necessary to complete their tasks safely.

7.0 Forms, Permits and Checklists

CH2M HILL authorized employees shall complete the Equipment-Specific Lockout/Tagout Procedure Development Form provided in Attachment 3 to create an equipment-specific lockout/tagout procedure when such procedures are not available or when existing procedures are determined to be insufficient.

The “HSE Self-Assessment Checklist – Lockout/Tagout” in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SSC and provides this information in the project’s written safety plan. The RHSM shall assist the SSC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor’s activities.



8.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria](#)

Attachment 2 [HSE Self Assessment Checklist](#)

Attachment 3 [Equipment-Specific Lockout/Tagout Procedure Development Form](#)

9.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	11/17/2006	Updated to Standard Operating Procedure	Angelo Liberatore; Mark Fagan	
2	08/15/2012	Added requirement in Section 5.2.3 Standard Lockout/Tagout Steps, number 7, Verification and Isolation to only use a properly rated and calibrated Volt/Ohm meter.	Jeff Stumpf	



Attachment 1: Subcontractor Health and Safety Procedure Criteria

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor lockout/tagout procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Lockout/Tagout Safety Procedures:

1. Provide the names and qualifications of employees who will be authorized to perform work under lockout/tagout conditions.
2. Provide a list of tasks and equipment where lockout/tagout will be required.
3. Provide machine or equipment specific lockout/tagout procedures for each piece of identified in Item No. 2.
4. Describe the specific lockout/tagout devices to be used for each piece of equipment to deenergized.
5. Provide safe-work-practice guidelines on verification of deenergized equipment (testing); isolation, blocking, and dissipating stored or residual energy; notification of affected employees; and verifying all personnel are clear prior to reenergizing systems.
6. Describe lockout/tagout inspection criteria or procedures (frequency of inspection; documentation; items to be inspected).
7. Provide a copy of the written hazardous energy control program to be used on the project.



Attachment 2: HSE Self-Assessment Checklist Lockout/Tagout



HSE Self-Assessment Checklist – LOCKOUT/TAGOUT

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used when: 1) CH2M HILL staff are exposed to lockout/tagout hazards (complete Section 1), 2) CH2M HILL staff are self-performing lockout/tagout activities (completed Section 2), or 3) CH2M HILL provides oversight of subcontractor personnel who are performing lockout/tagout activities (complete Sections 1 and 2).

Safety Coordinator may consult with subcontractors when completing this checklist, but shall not direct the means and methods of lockout/tagout operations nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL affected employee exposure to equipment during lockout/tagout
- ☐ Evaluate CH2M HILL authorized employee exposure to equipment requiring lockout/tagout
- ☐ Evaluate a CH2M HILL subcontractor's compliance with lockout/tagout requirements

Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-310.

SECTION 1

SAFE WORK PRACTICES (5.4)

Yes No N/A N/O

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Only trained and authorized personnel are performing lockout/tagout activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. All affected employees notified prior to lockout/tagout activities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Equipment has been shutdown using normal operating controls | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Employees do not attempt to start, energize or use equipment that is locked out or tagged | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Employees do not remove locks or tags placed on equipment by other personnel | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Affected employees are notified after lockout/tagout is completed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Employees verify that all safe guards have been replaced prior to equipment start-up | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 2		Yes	No	N/A	N/O
GENERAL (5.5.1)					
8.	Only trained and authorized personnel are performing lockout/tagout activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Daily safety briefing/meeting conducted with affected and authorized employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Employees made aware of any equipment-specific lockout/tagout procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Authorized employees provided with lockout devices, locks, tags and other isolation devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	New or modified equipment designed to accept lockout devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EQUIPMENT-SPECIFIC LOCKOUT/TAGOUT PROCEDURES (5.5.2)					
13.	LOTO procedures available when required to be documented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Equipment-specific LOTO procedures developed when not available from the facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Affected employees notified that equipment will be shut down for LOTO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Energy sources, hazards, and control measures determined	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Orderly shutdown of equipment is conducted that does not increase hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Energy isolating devices operated to isolate energy sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Authorized employees apply personal lockout devices and tags to energy isolating device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Lockout devices are applied to secure equipment in the “off” position	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Lockout tags applied to clearly indicate that operating the equipment is prohibited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Tags are located as close to or at the energy isolating device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	All hazardous stored or residual energy is relieved, disconnected or restrained.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.	Isolation of energy sources has been verified (tested) prior to of work on equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	Lockout tags are used alone only where lockout devices cannot be applied	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LOCKOUT DEVICES AND TAGS (5.5.4)					
26.	Lockout devices and tags only used to isolate energy sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27.	Lockout devices and tags are standardized by color, shape, size, print, and format	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28.	Lockout devices and tags indicate identity of employee applying the devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29.	Lockout devices and tags capable of withstanding anticipated environmental conditions of use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30.	Lockout devices are substantial enough to prevent removal without the use of excessive force	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31.	Tags and their means of attachment are substantial enough to prevent inadvertent removal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32.	Tags are legible and understandable by all employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33.	Tags warn against hazardous conditions if equipment is energized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RELEASING LOTO CONTROL (5.5.5)					
34.	Work area inspected prior to removing LOTO devices and reenergization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35.	LOTO devices only removed by authorized employees who applied the device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36.	If employee not available to remove LOTO devices, steps in Section 4.2.4 of SOP followed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37.	All affected employees notified prior to starting equipment previously locked or tagged out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP LOTO (5.5.6)					
38.	Group LOTO procedures followed when more than one employees is to work on equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39.	Primary authorized person assigned to coordinate LOTO process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40.	Normal steps for initiating LOTO control completed as above	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41.	Primary authorized person applies own lockout device and tag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42.	Each authorized person applies own lockout device and tag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43.	Primary authorized person removes LOTO devices after all other LOTO devices are removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SPECIAL CONDITIONS (5.5.7)					
44.	Shift or personnel changes coordinated to ensure LOTO protection is always provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45.	Procedures followed when LOTO devices are temporarily removed to test or reposition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Auditor: _____ Project Manager: _____

SECTION 3

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

[illegible]



Attachment 3

Equipment-Specific Lockout/Tagout Procedure Development Form

EQUIPMENT-SPECIFIC LOCKOUT/TAGOUT PROCEDURE DEVELOPMENT FORM

Project name: _____ Project No.: _____

Equipment identity (name, number, etc.): _____

Equipment location: _____

Authorized employee that developed this procedure: _____ Date: _____

Purpose

This procedure shall be used by CH2M HILL to establish the minimum requirements for the lockout/tagout of energy isolating devices whenever servicing and maintenance activities are performed on the above equipment. It shall be used to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources and locked out and tagged before employees perform any servicing and maintenance where the unexpected energization, start-up of the equipment, or release of stored energy could cause injury.

Compliance with this Procedure

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout/tagout. The authorized employees are required to perform the lockout/tagout in accordance with this procedure. All employees, upon observing equipment that is locked/tagged out shall not attempt to start, energize, or use the equipment.

Authorized Employee**Specific servicing and maintenance activity to be performed**

Sequence of Initiating Lockout/Tagout Control

- 1) Notify all affected employees that servicing and maintenance is required and that the equipment must be shut down and this lockout/tagout procedure implemented.

Affected Employee(s) Notified

- 2) Authorized employee(s) shall identify the type and magnitude of the energy that the equipment uses, and shall understand the hazards and the methods to control the energy.

Energy Sources**Magnitude****Hazards****Control methods**

- 3) If the equipment is operating, shut it down by the normal stopping procedures listed below.

Equipment shutdown steps:

- 4) Locate and operate energy isolating device(s) to isolate the equipment from the energy source(s).

Energy Isolating Device**Location****Isolated**

_____ ☐

_____ ☐

_____ ☐

EQUIPMENT-SPECIFIC LOCKOUT/TAGOUT PROCEDURE DEVELOPMENT FORM

- 5) Authorized employee(s) shall apply their personal lockout device and tag to each energy isolating device. Lockout devices and tags shall meet the requirements provided in Section 5.5.4 of the Lockout/Tagout SOP 310. When servicing and maintenance activities are to be performed by more than one authorized employee, a primary authorized employee shall be identified and a group lockout/tagout process shall be used that meets the requirements provided in Section 5.5.6 of the Lockout/Tagout SOP 310.

Primary Authorized Employee: _____ **Phone No.:** _____

- 6) Stored or residual energy shall be dissipated or restrained

Type(s) of stored energy

Methods to dissipate or restrain

_____	_____
_____	_____
_____	_____

- 7) Authorized employee(s) shall verify that isolation of the equipment has been completed by trying to operate the equipment using normal operating control(s) or by testing to verify that the equipment will not operate. Control(s) shall be returned to the neutral or "off" position after isolations are verified.

Method(s) used to verify equipment isolation: _____

Sequence of Releasing Lockout/Tagout Control

- 1) Verify that all personnel in the work area are in a safe position.
- 2) Ensure all nonessential items have been removed and equipment components are operationally intact, including the proper reattachment of all equipment safe guards.
- 3) Verify that the controls are in neutral or "off" position.
- 4) Each lockout device and tag shall be removed from each energy isolating device by the authorized employee who applied the devices. If an authorized employee is unavailable to remove their device, the requirements provided in Section 5.5.5 of the Lockout/Tagout SOP 310, shall be followed.
- 5) All affected employees shall be notified that the lockout devices and tags have been removed before starting the equipment.

Special Conditions

Shift or personnel changes made during servicing and maintenance activities shall be coordinated to ensure lockout/tagout protection is always provided, including the orderly transfer of lockout devices and tags between off-going and oncoming authorized employees.

Method(s) of lockout/tagout control transfer: _____

When lockout devices and tags must be temporarily removed from the energy isolating device and the equipment energized to test or reposition the equipment, the following sequence shall be followed:

- 1) Clear equipment of tools and materials and remove all employees from the equipment area.
- 2) Remove only the lockout devices and tags needed to energize the equipment for testing or repositioning.
- 3) Energize and proceed with testing or repositioning.
- 4) Deenergize the equipment and reapply the lockout devices and tags to continue the servicing and maintenance activities.

Other Requirements: _____



[Click here for attachment](#)

Hazardous Materials Handling

Enterprise Standard Operating Procedure HSE-403

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) outlines the requirements that CH2M HILL Legal Entities and Business Groups must comply, when handling hazardous materials.

2.0 Scope and Application

2.1 Scope

The scope of this SOP is the use and handling of hazardous materials. Shipping and transportation of hazardous materials is not addressed in this SOP, but is covered in the SOP HSE- 417, *Hazardous Materials Transportation*. Also explosive use and handling is not addressed in this SOP, but is covered in SOP HSE-610 "Explosive Usage and Munitions Response". Examples of hazardous material covered in this SOP include: flammable and combustible liquids, liquefied petroleum gas and compressed gas cylinders. Subcontractors who handle hazardous materials are responsible for storing, transporting, dispensing, and using these materials in accordance with applicable regulations and procedures.

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental and Occupational Safety and Health (OSHA) programs may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (RHSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL provides oversight of subcontractor's hazardous material operations; and/or
- CH2M HILL employees handle hazardous material.

2.3 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to hazardous material operations:

- [HSE-417 – Hazardous Materials Transportation](#)
- [HSE-610 - Explosive Usage and Munitions Response](#)
- [HSE-111 – Incident Notification, Reporting and Investigation](#)
- [HSE-117 - Personal Protective Equipment](#)
- [HSE-107 - Hazard Communication](#)

3.0 Definitions

3.1 Approved Safety Can

An approved safety can is a closed container having a flash-arresting screen, spring-closing lid, and spout cover, and so designed that it will safely relieve internal pressure when exposed to fire.

3.2 Combustible Liquid

A combustible liquid is any liquid having a flash point between 140° F and 200° F.

3.3 Compressed Gas

A compressed gas is a material in a container with an absolute pressure exceeding 40 pounds per square inch (psi) at 70° F or exceeding 104 psi at 130° F. This definition also includes any liquid flammable material with a vapor pressure exceeding 40 psi absolute (psia) at 100°F as determined by American Society for Testing and Materials (ASTM) Test D-323.

3.4 Corrosive

A corrosive is any hazardous material that acts with a corrosive effect. Examples are strong acids, strong alkalis, nonmetal chlorides, dehydrating agents, and halogens.

3.5 Flammable Liquid

A flammable liquid is any liquid having a flashpoint below 140° F.

3.6 Flammable Storage Cabinet

Flammable storage cabinets are cabinets whose internal temperature rises to no more than 325°F during a 10-minute fire test using the standard time-temperature curve set forth in Standard Methods of Fire Tests of Building Construction and Materials, National Fire Protection Association (NFPA) 251-1969. All joints and seams must remain tight and the door must remain securely closed during the fire test. The cabinet must be labeled in conspicuous lettering, "FLAMMABLE: KEEP FIRE AWAY."

3.7 Hazardous Material

A hazardous material is a substance or material that has been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and that has been so designated. The term includes hazardous substances; hazardous wastes; marine pollutants; elevated temperature

materials; materials designated as hazardous under 49 CFR 172.101; and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.

3.8 Liquefied Petroleum Gas

Liquefied petroleum gas is any material composed predominantly of any of the following hydrocarbons (or mixtures of them): propane, propylene, butane, and butylenes.

3.9 Pressure-Controlling Apparatus

Pressure-controlling apparatus is equipment used in conjunction with compressed gas cylinders and includes regulators, gauges, piping, hoses, and manifolds.

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Safety Coordinator (SC)

The Safety Coordinator (SC) is either the Site Manager (SM), or is designated by the SM to implement the project HSE Plan and who has successfully completed all required SC training. The SC trains CH2M HILL employees exposed to the hazards posed by hazardous materials handling operation, in hazard awareness and control procedures, as detailed in the site-specific health and safety plan. The SC serves as the competent person when CH2M HILL employees use hazardous materials handling. The SC also oversees subcontractor's hazardous materials handling operations.

5.0 Requirements

The following requirements outlined in this Enterprise SOP must be implemented.

5.1 Regulatory and Industry Standards

The following subsections provide the minimum regulatory and industry standard requirements pertaining to hazardous material handling operations. These requirements apply when CH2M HILL is overseeing subcontractor's hazardous material handling operations and self-performing these operations.

5.2 General Storage Guidelines

The following are general guidelines for storing chemicals and other hazardous materials:

- Keep acids away from bases
- Keep oxidizers (nitric acid, nitrates, peroxides, chlorates) and organics away from inorganic reducing agents (metals)
- Keep flammables and corrosives in appropriate storage cabinets
- Do not store paper or other combustibles near flammables

- Use secondary containment and lipped shelving that is secured
- Have a fire suppression system available
- Have an appropriate fire suppression system and fire extinguishers
- Ensure that the fire suppression system and fire extinguishers are visually inspected monthly and an annual maintenance check.

Refer to the Hazard Communication SOP (HSE-107) for the CH2M HILL policy on hazard communication.

5.3 Flammable and Combustible Liquids

Flammable and combustible liquids include motor fuels, paints, adhesives, and solvents. If CH2M HILL personnel bring these materials to a project field site, or use these materials, the following requirements apply.

5.3.1 General Storage

- Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.
- Approved safety cans shall be used for the handling and use of flammable liquids in quantities of 5 gallons or less.
- For quantities of 1 gallon or less, the original container may be used for storage and use of flammable liquids.
- Flammable or combustible liquids shall not be stored in areas used for stairways or normally used for the passage of people.

5.3.2 Indoor Storage

- No more than 25 gallons of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.
- Quantities of flammable and combustible liquids in excess of 25 gallons shall be stored in an acceptable or approved cabinet.
- Cabinets shall be conspicuously lettered: "FLAMMABLE: KEEP FIRE AWAY."
- Not more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area.

5.3.3 Outside Storage

- Storage of containers (not more than 60 gallons each) shall not exceed 1,100 gallons in any one area. No area shall be within 20 feet of any building.
- Storage areas shall be graded to divert spills away from buildings and surrounded by an earthen dike.
- Storage areas shall be free from weeds, debris, and other combustible materials.
- Outdoor portable tanks shall be provided with emergency vent devices and shall not be closer than 20 feet to any building.

- Signs indicating no smoking shall be posted around the storage area.

5.3.4 Dispensing

- Areas in which flammable or combustible liquids are dispensed in quantities greater than 5 gallons shall be separated from other operations by at least 25 feet.
- Drainage or other means shall be provided to control spills.
- Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.
- Dispensing of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).
- Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks is prohibited.
- Dispensing devices and nozzles for flammable liquids shall be of an approved type.

5.3.5 Use

- Flammable liquids shall be kept in closed containers when not in actual use.
- Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.
- Sources of ignition shall be kept at least 50 feet from flammable liquids.

5.4 Liquefied Petroleum Gas

Liquefied petroleum gas (LPG) is typically used as heating fuel. Requirements for the use of LPG include the following:

- LPG containers must meet DOT requirements.
- Each container or system must have a safety relief device or valve in good working order.
- A portable heater using LPG must have an automatic shutoff device in the event of flame failure.
- Storage of LPG within buildings is prohibited.
- The LPG storage location shall be equipped with at least one portable fire extinguisher having a rating of not less than 20-B:C.

5.5 Compressed Gas Cylinders

Compressed gas cylinder users are responsible for the safe and proper use of the cylinder and its contents. The following precautions shall be observed by cylinder users.

5.5.1 General

- Cylinders and pressure-controlling apparatus shall be inspected for defects and leakage prior to use. Damaged or defective items shall not be used. If a cylinder is found to be defective, the gas distributor shall be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.

- Cylinder users shall not modify, tamper with, or attempt repair on cylinders or pressure-controlling apparatus.
- Only the owner of the cylinder or the owner's authorized agent shall refill a cylinder or attempt to mix gases in a cylinder.
- Cylinders shall be labeled with the identity of the contents. Cylinders not labeled shall be sent back to the cylinder distributor. The color of the cylinder shall not be used exclusively to identify cylinder contents.

5.5.2 Transportation

- Cylinders shall not be rolled in the horizontal position or dragged. A suitable hand truck, forklift, or similar material handling device shall be used.
- Cylinders being transported shall have valve protection caps installed.
- Cylinders shall be in the vertical position when transported by motor vehicle, hoisted, or carried.
- Cylinders shall be hoisted by a cradle or pallet designed for such use, and not by magnets, slings, or their valve protection caps.

5.5.3 Storage

- Cylinders shall be stored in the vertical position with valve protection caps installed.
- Cylinders shall be secured by a chain or other stabilizing device to prevent being knocked over.
- Cylinders shall be stored away from readily ignitable substances, such as gasoline or oil, and away from other highly combustible materials.
- Cylinders shall be protected from exposure to temperature extremes. High temperatures may result in excessive cylinder pressure. Never apply a flame or heat directly to any part of a cylinder or allow it to come into contact with a radiant heat source. Never allow cylinders to come into contact with an electrically energized source.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet or by a noncombustible barrier at least 5 feet high, having a fire resistance rating of at least 0.5 hour.
- Cylinders inside buildings shall be stored in dry, well-ventilated locations at least 20 feet from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas shall be located where cylinders will not be knocked over or damaged.
- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinders.

5.5.4 Placement for Use

- Cylinders shall be located where they will not be knocked over or damaged and shall be secured in the vertical position.

- Cylinders shall not be placed where they can become part of an electrical circuit. When cylinders are used in conjunction with electric welding, they shall not be grounded or used for grounding.
- Cylinders shall be kept far enough away from welding and cutting operations to prevent sparks, hot slag, or flames from reaching them. When this is impractical, fire-resistant shields shall be provided.
- Cylinders shall not be taken into confined spaces.

5.5.5 Cylinder Connections

- Pressure-controlling apparatus provided for use with a particular gas or group of gases shall not be used on cylinders having different chemical properties unless information obtained from the gas manufacturer indicates that this can be done safely. For example, only pressure-regulating devices approved for use with oxygen shall be used in oxygen service.
- Cylinders and pressure-controlling apparatus shall be kept free of oil and grease.
- Pressure-controlling apparatus shall be kept gastight to prevent leakage. This can be confirmed by the use of a compatible leak-test solution or an appropriate leak-detection instrument. Do not tighten connections or leaking fittings or attempt other repairs while the system is under pressure.
- Cylinders should not be attached to a process where the cylinder may be contaminated by the backflow of other process materials. In cases where this is possible, design considerations must include the use of check valves or traps for this purpose.
- Where cylinders are connected to a manifold, the manifold and its related equipment, such as regulators, shall be of proper design for the product(s) they are to contain at the appropriate temperatures, pressures, and flow rates. Manifolds shall be labeled and placed in well-ventilated and accessible locations.
- Cylinders shall never be cross-connected with plant air lines.
- Flash arresters or reverse-flow check valves should be installed on all flammable cylinders.

5.5.6 Use

- Eye protection (safety glasses or goggles) shall be worn when using cylinders.
- The cylinder valve and regulator shall be inspected for foreign material such as grease, oil, or dirt before connecting. The valve shall be opened slightly and closed immediately. This is referred to as “cracking” and is intended to clear the valve of dust or dirt. The person cracking the valve shall stand to the side of the outlet. The valve of a fuel gas cylinder shall not be cracked where the gas could reach an ignition source.
- If cylinders are frozen, warm (not boiling) water shall be used to thaw them.
- The cylinder valve shall remain closed except when the cylinder is in use.
- Fuel gas cylinder valves shall not be opened more than 1 ½ turns, for quick closing. When a special wrench is used to open a cylinder valve, it shall be left in position on the valve.

- Acetylene cylinders shall be used in the vertical position to minimize the possibility of solvent being discharged. Never adjust an acetylene regulator to obtain a delivery pressure greater than 15 psi gauge (psig). If acetylene is used in areas with elevated ambient pressure, verify that the gauge plus ambient pressure does not exceed 30 psia. Never use "pure" copper pipe or fittings on acetylene systems because dangerous oxides may form internally, causing an explosion.
- Never use compressed gas to dust off clothing because this may cause serious injury to the eyes or body or create a fire or toxic hazard.
- Before a regulator is removed from a cylinder, the cylinder valve shall be closed and the regulator relieved of internal pressure.

5.6 Subcontractor HSE Oversight

Subcontractors are responsible and accountable for implementing their own HSE procedures, which must comply with HSE regulations and industry standards. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HSE requirements.

The subcontractor's supervisor serves as the overall competent person for construction activities. When the subcontractor employees use hazardous materials, they shall be trained in the hazards, proper PPE, procedures and precautions to take when handling hazardous material. The subcontractor's supervisor will oversee all these operations.

5.7 CH2M HILL Self-Perform Requirements

When CH2M HILL employees use hazardous materials, they shall be trained in the hazards, proper PPE, procedures and precautions to take when handling hazardous material. The SC will oversee all these operations. The SC serves as the competent person, when CH2M HILL employees use hazardous materials on projects.

6.0 Training Requirements

CH2M HILL employees, who are exposed to the hazards posed by handling hazardous materials, are required to be trained in hazard awareness and control procedures by the SC, as detailed in the site-specific health and safety plan. The SC must successfully complete all CH2M HILL required SC training.

CH2M HILL employees, who work on construction projects, are required to complete the OSHA 10-Hour Construction Safety Awareness training course that includes instruction on hazardous materials handling and control measures, and fire extinguisher use.

CH2M HILL employees who handle hazardous materials shall complete the applicable computer-based training modules located on the HSE web page, such as Hazard Communication, Chemical Management at Construction Sites, Personal Protective Equipment, and Fire Extinguisher Use. CH2M HILL employees such as safety coordinators and other employees who may be required to use a fire extinguisher for incipient stage fires as part of their job duties are required to take fire extinguisher training, located on the HSE website (or equivalent). The training provides instruction on the elements necessary for fire to

occur, fire classifications, how to control fires, different types of fire extinguishers, and the proper use and handling of fire extinguishers

Subcontractors are responsible for complying with all applicable HSE training regulations providing the training necessary to complete their tasks safely. Subcontractor training shall be verified prior to the start of field operations.

7.0 Forms, Permits and Checklists

The “HSE Self-Assessment Checklist – Hazardous Materials Handling in Attachment 1 may be used to verify subcontractor’s and CH2M HILL self-perform compliance with safety procedures, established practices, regulations, and industry standards. The RHSM specifies the frequency in which this checklist should be completed by the SC and provides this information in the project’s written safety plan. The RHSM may also use this checklist when performing HSE audits at CH2M HILL projects, including subcontractor’s activities.



8.0 References

None

9.0 Attachments

Attachment 1 [HSE Self Assessment Checklist-Hazardous Materials Handling](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	11/1/2007	<p>Revised existing CH2M HILL SOP to apply when: employees are exposed to the hazard; oversight of subcontractor operations and CH2M HILL self-perform operations.</p> <p>SOP requirements include safe work practices and regulatory and industry standards pertaining to hazardous material handling operations.</p> <p>When CH2M HILL employees handle hazardous materials.</p> <p>Subcontractor Safety Procedures Criteria and HSE Self-Assessment Checklist are not mandatory, but are provided in the attachments as a tool to oversee subcontractor's operations and to assess CH2M HILL self perform compliance with the SOP</p>	Angelo Liberatore	
2	08/09/2011	Clarification in Section 6.0, Training on training requirements for hazardous materials handling including fire extinguisher training	Jeff Stumpf/ Jeannie Armstrong	



Attachment 1: HSE Self-Assessment Checklist-Hazardous Materials Handling



HSE Self-Assessment Checklist: HAZARDOUS MATERIALS HANDLING

Page 1 of 3

This checklist is provided as a method of verifying compliance with regulations pertaining to the handling of hazardous materials. It shall be used at locations where CH2M HILL employees handle hazardous materials, or are required to perform oversight of subcontractor personnel handling hazardous materials, or both.

CH2M HILL staff shall not direct the means and methods of subcontractor operations nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies, and CH2M HILL staff must carefully rely on the subcontractor's expertise. Items considered imminently dangerous (possibility of serious injury or death) must be corrected immediately, or all exposed personnel must be removed from the hazard until it is corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

- ☐ Evaluate CH2M HILL compliance with hazardous material handling requirements (SOP HSE-403)
☐ Evaluate a CH2M HILL subcontractor's compliance with hazardous material requirements
Subcontractor's Name: _____

- Check "Yes" if an assessment item is complete or correct.
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard Operating Procedure HSE-403.

SECTION 1

Yes No N/A N/O

GENERAL GUIDELINES (5.2)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Acids are stored away from bases. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Oxidizers and organics are stored away from inorganic reducing agents. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Flammables and corrosives are stored in appropriate storage cabinets. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Paper and other combustibles are not stored near flammables. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Secondary containment and lipped shelving are in place in storage areas. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. A fire suppression system is available. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

FLAMMABLE AND COMBUSTIBLE LIQUIDS (5.3)

GENERAL STORAGE (5.3.1)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 7. Only approved containers/portable tanks used to store flammable and combustible liquids. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Approved safety cans used for handling flammable liquids in quantities 1-5 gallons. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. For quantities of one gallon or less, the original container must be used for storage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Flammable or combustible liquids are not stored in stairways or personnel passageways. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

<u>SECTION 1 (continued)</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
INDOOR STORAGE (5.3.2)				
11. Quantities of flammable or combustible liquids > 25 gallons stored in approved storage cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. No more than 25 gallons of flamm. or comb. liquids can be stored outside an approved cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Cabinets are labeled with "FLAMMABLE: KEEP FIRE AWAY."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. No more than 60 gallons of flamm. or 120 gallons of comb. liquids stored in one storage cabinet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Not more than three cabinets located in a single storage area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OUTSIDE STORAGE (5.3.3)				
16. Storage of containers (not more than 60 gallons each) do not exceed 1,100 gallons in any area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Storage areas are not within 20 feet of any building.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Storage areas graded to divert spills away from buildings and surrounded by an earth dike.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Storage areas are free from weeds, debris, and other combustible materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Outdoor portable tanks are provided with emergency vent devices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Outdoor portable tanks are no closer than 20 feet from any building.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Signs indicating no smoking are posted around the storage area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DISPENSING (5.3.4)				
23. Areas where liquids are dispensed in >5-gal quantities are separated from other operations by 25'.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Drainage or other means provided to control spills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Adequate natural or mechanical ventilation provided to maintain concentration of flammable vapor < 10% of the lower flammable limit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Dispensing of flammable liquids from one container to another is done only when containers are electrically interconnected (bonded).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Dispensing flammable or combustible liquids by means of air pressure on the container or portable tanks prohibited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Dispensing devices and nozzles for flammable liquids are of an approved type.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USE (5.3.5)				
29. Flammable liquids are kept in closed containers when not in actual use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Leakage or spillage of flammable or combustible liquids is disposed of promptly and safely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Sources of ignition are kept at least 50 feet from flammable liquids.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LIQUID PETROLEUM GAS (5.4)				
32. LPG containers meet DOT requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Each container or system has a safety relief device or valve in good working order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Portable heaters using LPG have an automatic shutoff device in the event of flame failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Storage of LPG within buildings is prohibited.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. LPG storage location has at least one portable fire extinguisher rated not less than 20-B:C.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COMPRESSED GAS CYLINDERS (5.5)				
GENERAL (5.5.1)				
37. Cylinders and apparatus inspected for defects and leakage prior to use. Damaged items not used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Gas distributor notified and subsequent instructions followed for defective cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Leaking cylinders removed from the work area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Cylinder users do not modify, tamper, or attempt repair on cylinders or apparatus.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Only cylinder owners or authorized agent refill cylinders or attempt to mix gases in a cylinder.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Cylinders labeled with the identity of the contents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 1 (continued)	Yes	No	N/A	N/O
TRANSPORTING (5.5.2)				
43. Cylinders not rolled in the horizontal position or dragged; suitable material-handling device used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Cylinders being transported have valve protection caps installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Cylinders in vertical position when transported by motor vehicle, hoisted, or carried.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Cylinders hoisted by a cradle or pallet designed for such use, and not by magnets, slings, or their valve protection caps.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
STORAGE (5.5.3)				
47. Cylinders are stored in the vertical position with valve protection caps installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Cylinders are secured from being knocked over by a chain or other stabilizing device.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Cylinders are stored away from readily ignitable substances.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Cylinders are protected from exposure to temperature extremes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Oxygen cylinders in storage are separated from fuel gas cylinders or combustible materials > 20' or by a ½-hour fire-resistant barrier at least 5' high.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Cylinders inside buildings are stored in dry, well-ventilated locations > 20' from comb. materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Cylinders are stored in definitely assigned places away from elevators, stairs, or gangways.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Signs indicating no smoking are provided for storage areas containing flammable gas cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLACEMENT FOR USAGE (5.5.4)				
55. Cylinders are located where they will not be knocked over or damaged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Cylinders are secured in the vertical position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Cylinders are not placed where they can become part of an electrical circuit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Cylinders are kept far enough away from welding and cutting operations to prevent sparks, hot slag, or flames from reaching them. When impractical, fire resistant shields are provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Cylinders are not taken into confined spaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CYLINDER CONNECTIONS (5.5.5)				
60. Pressure-controlling apparatus is compatible with the particular gas used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Cylinders and pressure-controlling apparatus are kept free of oil and grease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Pressure-controlling apparatus is kept gastight to prevent leakage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Cylinders not attached to process where backflow could occur unless check valves or traps used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Manifolds designed for product used at the appropriate temperatures, pressures, and flow rates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Manifolds are labeled and placed in well-ventilated and accessible locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66. Cylinders are not cross-connected with plant air lines.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Flash arrestors or reverse flow check valves are installed on all flammable gas cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USAGE (5.5.6)				
68. Eye protection (safety glasses or goggles) is worn when using cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69. Cylinder valve and regulator are inspected for foreign material before connecting.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70. If cylinders are frozen, warm (not boiling) water is used to thaw cylinders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71. Cylinder valve remains closed except when the cylinder is in use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72. Fuel gas cylinder valves are not opened more than 1½ turns, for quick closing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73. If a special wrench is used to open a cylinder valve, it is left in position on the valve.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74. Acetylene cylinders are used in the vertical position.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75. Acetylene cylinders are not used > 15 psig or > 30 psia.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76. Copper pipe or fittings are not used with acetylene systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
77. Compressed gas is not used to dust off clothing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78. Cylinder valve closed and regulator relieved of internal pressure before regulators are removed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hazardous Materials Transportation

Enterprise Standard Operating Procedure HSE-417

1.0 Purpose

This Enterprise Standard Operating Procedure (SOP) describes the requirements that all CH2M HILL employees must comply with when shipping or transporting hazardous materials (also known as dangerous goods).

2.0 Scope and Application

2.1 Scope

The purpose of this SOP is to protect CH2M HILL against the significant risk of shipping or transporting cargo, hazardous materials, and hazardous wastes in a manner that is inconsistent with applicable laws and regulations. This SOP outlines the compliance requirements for shipping and transportation of hazardous materials (which include hazardous waste). The use and storage of hazardous materials is not addressed in this SOP, but is covered in Enterprise SOP HSE-403, *Hazardous Materials Handling*. Subcontractors shipping or transporting hazardous materials must do so in accordance with applicable regulations and procedures.

2.2 Application

This SOP applies Enterprise-wide to CH2M HILL employees who ship or transport hazardous materials in the United States. This SOP may be used as a starting point for international operations, but country-specific regulations shall prevail, and a country-specific SOP should be developed to comply with the specific regulations. A person who performs the following activities is subject to the US Department of Transportation hazardous materials regulations, and to the procedures in this SOP:

- Determining whether a material is regulated as a hazardous material
- Selecting packaging for hazardous materials
- Preparing hazardous materials for transportation
- Preparing and/or reviewing the shipping papers or hazardous waste manifest
- Signing the hazardous materials certification on shipping papers
- Placing hazardous materials placards, markings, or labels on vehicles or packages
- Loading, unloading, or handling hazardous materials during transportation

- Testing, reconditioning, repairing, modifying, or marking containers for use in hazardous materials transportation
- Operating a vehicle used to transport hazardous materials.

The Enterprise [Hazardous Waste Policy](#) states that our employees will not directly provide commercial transportation services to or on behalf of clients. The rigor of developing and maintaining a carrier regulatory compliance program, the high risk and liability, and the cost of transporter/carrier insurance usually outweighs potential business benefits. CH2M HILL's intent is to subcontract transportation services to licensed, registered, reputable transporters. Under certain circumstance some materials, goods, and chemicals may be transported in company vehicles, but these situations are limited and written site-specific approvals may be needed due to the complexity of the regulations as discussed in Section 5.9.

2.3 Applicability Enterprise Policy, Core Standards, and SOPs

Other Enterprise Policy, Core Standards and SOPs that may be applicable to hazardous material operations:

- [Hazardous Waste Policy](#)
- [Hazardous Materials Transportation Core Standard](#)
- [SOP 107, Hazard Communication](#)
- [SOP 111, Incident Notification, Reporting, and Investigation](#)
- [SOP 215, Contracts, Subcontracts, and HSE Management Practices](#)
- [SOP 403, Hazardous Materials Handling](#)
- [SOP 410, Waste Management: U.S. Hazardous Waste Manifests](#)
- [SOP 610, Explosive Usage and Munitions Response](#)

3.0 Definitions

3.1 Cargo-Carrying Aircraft

An aircraft, other than a passenger aircraft, that carries goods or property.

3.2 CHEM-TEL

CH2M HILL's 24-hour emergency response information service telephone number in the U.S. is (800) 255-3924. The services of CHEM-TEL under the CH2M HILL agreement (No. MIS0001537) are not transferrable to our clients. Shipments on behalf of clients should reference the client's emergency response information number or service.

3.3 Combination Packaging

A combination of packaging consisting of one or more inner packagings (bottles) secured in a nonbulk outer packaging (box, cooler).

3.4 Combustible Liquid

A combustible liquid is any liquid having a flash point between 140° F and 200° F.

3.5 Compressed Gas

A compressed gas is a material in a container with an absolute pressure exceeding 40 pounds per square inch (psi) at 70° F or exceeding 104 psi at 130° F. This definition also includes any liquid flammable material with a vapor pressure exceeding 40 psi absolute (psia) at 100°F as determined by American Society for Testing and Materials (ASTM) Test D-323.

3.6 Corrosive

A corrosive material is any hazardous material (liquid or solid) that acts with a corrosive effect on skin, steel, or aluminum based on testing described in 49 CFR 173.136. Examples are strong acids, strong alkalis, nonmetal chlorides, dehydrating agents, and halogens.

3.7 Dangerous Goods or Hazardous Materials

A substance or material, including a hazardous substance that the U.S. Department of Transportation (DOT) has determined can pose an unreasonable risk to health, safety, and property when transported in commerce and that DOT has designated as a hazardous material; or that the International Air Transport Association has designated as a dangerous good for the purposes of air transportation.

3.8 DOT Hazmat Registration Number

Specific DOT registration number assigned to a party offering certain hazardous materials for transportation and to carriers/transporters accepting these materials for transportation. In most cases, the client's DOT registration number is used because the client is the offeror. Anyone offering or transporting the hazardous materials described in Section 5.8.1 are subject to the registration requirement under 49 CFR 107, Subpart G.

3.9 Explosives

Any substance or article, including a device, which is designed to function by explosion, or which, by chemical reaction within itself, is able to function in a similar manner.

3.10 Flammable Liquid

A flammable liquid is any liquid having a flashpoint below 140° F.

3.11 Gross Weight

Gross weight is the weight of packaging material plus the weight of the contents of the package.

3.12 Hazard Class

Hazard classes defined by DOT are as follows: CLASS 1—explosives, CLASS 2—gases, CLASS 3—flammable liquids, CLASS 4—flammable solids, CLASS 5—oxidizers and organic

peroxides, CLASS 6—poisonous and infectious substances, CLASS 7—radioactive materials, CLASS 8—corrosives, CLASS 9—miscellaneous hazardous materials.

3.13 HazMat ShipRight Tool

The [HazMat ShipRight](#) tool is an online tool available on the HSE website that provide instructions for proper packaging and shipping descriptions for more common hazardous materials shipped by CH2M HILL.

3.14 Inner Packaging

Inner packaging is a container for which an outer package is required for transport.

3.15 Limited Quantity

Limited quantity is the maximum amount of a hazardous material for which there is a specific labeling or packaging exception.

3.16 Motor Vehicle

A motor vehicle is run by mechanical power and is used on public highways to transport passengers or property. This includes a vehicle, machine, tractor, trailer, semitrailer or any combination thereof.

3.17 Net Weight

Net weight is the weight of only the contents of a package, not including the weight of packing material (weigh the contents separately to get net weight).

3.18 Offeror

Factors considered in determining a party's "offeror" status include functions actually performed or undertaken by the party, and functions which the party contracts to perform. Offeror functions include: selection of the packaging for regulated materials, physical transfer of the materials to a carrier, classifying hazardous materials, preparing shipping papers, reviewing shipping papers to verify compliance with the Hazardous Material Regulations or equivalent international standard, signing hazardous materials certifications on shipping papers, placing hazardous materials markings or placards on vehicles or packages, and providing placards to the transporter [57 FR 48740, October 28, 1992].

3.19 Outer Packaging

Outer packaging is the outer part of a composite or combination packaging together with absorbent materials, cushioning, and other components necessary for containing and protecting inner packages.

3.20 Overpack

An enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowing. Packages of dangerous goods in the overpack must be properly packed, marked, and labeled and must be in proper condition.

3.21 Package

A package is the packaging (that is, the box, inner bottles, product, and absorbent) plus contents.

3.22 Packaging

Packaging is the assembly of one or more containers and other components necessary to comply with the minimum packaging requirements of this document.

3.23 Packing Group

Packing group is a category indicating the relative degree of danger presented by various articles and substances within a class or division. Roman numerals I, II, and III are used to represent “great danger” (Packing Group I), “medium danger” (Packing Group II), and “minor danger” (Packing Group III).

3.24 Passenger-Carrying Aircraft

An aircraft that carries any person other than a member of the flight crew, a company employee, an authorized representative of the United States, or a person accompanying a shipment.

3.25 Proper Shipping Name

The complete name of the hazardous material as shown in 49 CFR 172.101 or the IATA list of dangerous goods in bold type or as specified in the guidelines.

3.26 Quantity Limit

The maximum amount of a hazardous material allowed per package.

3.27 Receptacle

A receptacle is a container, including closures, for holding substances or articles.

3.28 Reportable Quantity

Reportable quantities (RQ) are listed in 49 CFR 172.101, Appendix A. The letters “RQ” must be entered appropriately on a shipping paper if the quantity of a hazardous substance in one package equals or exceeds the RQ.

3.29 Single Packaging

Packaging that does not require inner packaging to perform its containment function during transport.

3.30 Technical Name

A recognized chemical name (e.g., acetone, toluene) or microbiological name (e.g., bacteria, fungus) currently used in scientific and technical handbooks, journals, and texts. Generic descriptions are authorized for use as technical names if they readily identify the general

chemical group. Examples of acceptable generic descriptions are organic phosphate compounds, petroleum aliphatic hydrocarbons, tertiary amines.

3.31 UN Number

A four-digit number assigned to a particular dangerous good, preceded by the letters UN (United Nations), to help identify the hazard associated with the substance in case of emergency.

4.0 Roles and Responsibilities

The roles and responsibilities provided in the HSE Responsibilities Core Standard apply to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 CH2M HILL Employees

CH2M HILL employees shipping or transporting hazardous materials must comply with this SOP, including:

- Complete online [Dangerous Goods Shipping Training](#).
- Use the online [HazMat ShipRight](#) tool to initiate all hazardous materials shipments.
- Contact a Dangerous Goods Advisor for instructions or clarification on hazardous materials shipments.
- Provide copies of dangerous good shipping declarations to their office mail room for filing if the office address is used as the shipper.
- Obtain written approvals prior to hauling or transporting hazardous materials on public roads as described in Section 5.9.

4.2 Mailroom Staff

Mailroom Staff have responsibilities applicable to CH2M HILL Employees, plus:

- Keep adequate quantities of hazardous material shipping supplies on hand, including labels, packaging, cushioning materials, etc.
- Keep hazardous materials shipping records in a designated file in the office for a minimum of two years.
- Be familiar with agency inspection procedures and contact a Dangerous Goods Advisor for assistance during an agency inspection.

4.3 Dangerous Goods Advisors

Dangerous Goods Advisors are responsible for:

- Overseeing the Dangerous Goods Management Program and assisting CH2M HILL employees with hazardous materials shipping.
- Reviewing regulatory changes and updating this SOP as needed.

- Keeping their applicable external DOT and International Air Transportation Association (IATA) training certifications current.
- Consulting with project teams on transportation standards, such as DOT Certificates of Registration, Hazardous Materials Regulations, Motor Carrier Safety rules, IATA standards, and International Civil Aviation Organization (ICAO) standards.

5.0 Requirements

The following requirements apply to CH2M HILL employees shipping or transporting hazardous materials. Hazardous materials must be packaged, labeled, and shipped or transported in accordance with these procedures and as approved by CH2M HILL Dangerous Goods Advisors.

5.1 Training

CH2M HILL personnel shipping or transporting dangerous goods must complete the computer-based [Dangerous Goods Shipping training](#) at least every 2 years. Only CH2M HILL employees who have successfully completed this training shall be permitted to ship or transport dangerous goods. Refer to Section 6.0, *Training*, for more information.

5.2 HazMat ShipRight Tool

The online [HazMat ShipRight](#) tool must be used by CH2M HILL employees to initiate all hazardous materials shipments. The tool emails the user detailed instructions found in this SOP and notifies Dangerous Goods Advisors that hazardous materials are being shipped.

5.3 Dangerous Goods Advisors

CH2M HILL Dangerous Goods Advisors must be consulted for shipments that are not included in the HazMat ShipRight tool and for any clarifications.

5.4 Preferred Shipping Destination

CH2M HILL prefers to have hazardous materials shipped directly to the project site where they will be used, thereby eliminating the need for CH2M HILL personnel to be involved in hazardous materials transportation. Do not store or temporarily hold hazardous materials in our offices. Such storage violates office building leases and local fire codes. Hazardous materials could also be sent to the CH2M HILL equipment warehouses and held there temporarily prior to shipment to the project site.

5.5 Transportation Documents

There are several documents required for shipment and transport of hazardous materials. This includes, but is not limited to:

- Shipping papers with proper shipping descriptions
- Emergency response information and phone numbers
- Transportation security plans

5.5.1 Shipping Papers

Shipping papers are documents that describe the hazardous material being offered for transportation.



Motor Vehicles: Hazardous materials shipping papers for motor vehicle shipments may be in any form, but certain specified information must be included. A uniform hazard waste manifest (EPA Form 8700-22) is the required shipping paper for shipments of hazardous waste. Refer to SOP 410, *Waste Management: U.S. Hazardous Waste Manifest* for more information.

Only employees who have taken a basic Dangerous Goods Shipping training at a minimum may sign the shipper's certification on shipping papers. Refer to Section 6.0, *Training*, for more information. CH2M HILL employees **must not** sign hazardous waste manifests unless authorized in accordance with the Enterprise Hazardous Waste Policy and SOP 410, *Waste Management: U.S. Hazardous Waste Manifest*.



Aircraft: An original USA **airbill** must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, or ordered directly from FedEx. CH2M HILL has national agreements with FedEx. UPS cannot be used for hazardous materials shipments. Shipping rates will vary depending upon location and type of service. Follow the instructions on the reverse side of the airbill or contact your local mailroom personnel for assistance with completing the airbill. Contact your Dangerous Goods Advisor for dangerous goods shipping questions.

Aircraft dangerous goods shipments must also be accompanied by a **Shipper's Declaration for Dangerous Goods**, which is a type of shipping paper. The total net quantity of dangerous goods per package must be shown (as opposed to shipping by highway requirements for total quantity by weight or volume). FedEx requires that approved software be used to complete the Declaration. Instructions generated by the HazMat ShipRight tool include a link to download FedEx Ship Manager.

The image displays two shipping documents. On the left is a FedEx USA Airbill, form number 813407188752, with a tracking number 0200. It includes sections for 'From' (Sender's Details), 'To' (Recipient's Details), and 'Your Internal Billing Reference'. On the right is a 'SHIPPER'S DECLARATION FOR DANGEROUS GOODS' form, which is a FedEx Express form. It includes sections for 'SHIPPER'S DECLARATION FOR DANGEROUS GOODS', 'TRANSPORT DETAILS', 'NATURE AND QUANTITY OF DANGEROUS GOODS', and 'Additional Handling Information'. The form is designed to be filled out by the shipper and includes a 'WARNING' section about the consequences of non-compliance with hazardous materials regulations.

5.5.1.1 Shipping Descriptions

Hazardous materials must be properly described on the shipping paper in accordance with DOT/IATA regulations. These regulations require that the shipping description for a hazardous material include the following information:

- Identification number
- Proper shipping name
- Hazard class associated with the material
- Packing group
- Total quantity of material by weight or volume
- Hazardous substance names in parentheses, accompanied by the letters RQ as necessary
- Technical names of constituents in parentheses, as necessary

DOT/IATA require that the ID number, shipping name, hazard class, and packing group (often referred to as the basic description) be presented in this sequence. Additional information, such as technical names and hazardous substance names are required after the basic description for specified materials.

Proper names are specified in the table in 49 CFR 172.101 and IATA DGR Section 4. In general, the shipping names are either:

- Chemical or technical names (e.g., Acetone or Petroleum oil)
- Names identifying material uses (e.g., “Lithium battery” or “Paint related material”)
- Generic names associated with hazards (e.g., “Flammable liquids, n.o.s.” or “Poisonous gases, n.o.s.”)

It is important to use the most specific name of the material. For example, if paint is being transported, the proper shipping name is “Paint” which is more specific than “Flammable liquid, n.o.s.” (“n.o.s.” means not otherwise specified). Since marking, labeling and packaging requirements are determined by the shipping name, it is very important that the proper name for the hazardous materials to be shipped is selected by an expert. A Dangerous Goods Advisor must be consulted for hazardous materials not included in the HazMat ShipRight tool or Attachment 2, *Example Shipping Instructions*. Do not guess!

5.5.2 Emergency Response Information

You are required to maintain emergency response information for your dangerous goods shipment. The MSDS or *Emergency Response Guidebook* provides the following information:

- Immediate hazards to health
- Risk of fire or explosion
- Immediate precautions to be taken in an accident or incident
- Immediate methods for handling fires
- Initial methods for handling spills or leaks in the absence of fire
- Preliminary measures for first aid

An Emergency Response Phone Number must also be provided. The phone must be staffed 24/7 by the offeror or an organization who has knowledge of the hazardous material shipped, is capable of and accepts responsibility for providing detailed information about the shipment and has comprehensive emergency response and incident mitigation information.

ChemTel is CH2M HILL's emergency response vendor. ChemTel is provided copies of the MSDSs for the dangerous goods that are typically being shipped by CH2M HILL. Contact a Dangerous Goods Advisor to learn if your material is on our list of registered materials. Use this text for emergency response number on the shipping document:

"Emergency Response Telephone Number (800) 255-3924 (ChemTel contracted by CH2M HILL)"

Note: The services of ChemTel are not transferrable to clients. When shipping on behalf of clients (e.g., hazardous wastes from a project site), the client's emergency information number should be referenced.



Motor Vehicles: Emergency Response Information must be available during loading and transportation of hazardous materials. You are responsible for providing the information in a document that is not on the package. It must be within reach of the driver of the vehicle. You may reference the appropriate Guide Number for each hazardous material on the shipping paper as long as a copy of the Guidebook is carried by the transporter. Alternatively, a copy of the appropriate page(s) from the *Emergency Response Guidebook* for each item is sufficient with the basic description and technical names referenced on the page.

If including an MSDS to accompany each item in the shipment, the basic description and technical names should be written on the MSDS(s). MSDSs are available from CH2M HILL equipment personnel and from the vendor or supplier of the dangerous goods.



Aircraft: The emergency response information must be available during handling of the dangerous good prior to shipment and the emergency response phone number must be entered on the Dangerous Goods Declaration.

5.5.3 Transportation Security Plan

In response to 9/11 terrorist attacks, the DOT promulgated requirements to address the security risks for hazardous material shipments. The rule requires that employees be aware of potential security concerns, and take actions such as:

- Understand the security risks involved with transporting hazardous materials.
- Transporters of hazardous materials subcontracted to CH2M HILL must be prequalified by an Environmental Manager who evaluates the carrier's safety rating. Refer to SOP 215, *Contracts, Subcontract, and HSE Management Practices*.
- When shipping hazardous materials, check driver credentials and ask about shipping details.

- When receiving a hazardous materials shipment, inspect packages for signs of tampering or damage to the contents. Verify the drivers and company information on the form with the driver.
- If there is suspicious or unusual behavior (e.g., driver without credentials, evasive answers) or any discrepancies identified, do not offer or accept the shipment, and immediately notify the Project Manager or Environmental Manager.

Employees responsible for shipping high-hazard materials (e.g., explosives, radioactive, poisonous by inhalation, or large bulk quantities of specified materials) must review and be trained under the CH2M HILL Transportation Security Plan (**Attachment 1**).

5.5.4 Recordkeeping

Shipping papers must be retained for two years after the material is accepted by the initial carrier (hazardous waste manifests must be kept for three years). If the shipper's address on a hazardous materials shipping paper (including a dangerous goods declaration used for air transportation) is a CH2M HILL office, a copy of the shipping paper/dangerous good declarations must be given to the office mail room for filing. If a client's address is used as the shipper, a copy of the shipping paper must be sent to the client for filing. A copy of the shipping paper/dangerous goods declarations or manifest must also be retained in the CH2M HILL project files.

5.6 Packaging, Marking, and Labeling

The person offering a hazardous material for transportation must use proper packaging and mark and label the package. Consideration must be given to all modes of transportation a package may encounter. A package originally prepared for shipment by highway may not conform to the requirements for shipment by air. A package that is prepared in accordance with the IATA DGR will also be acceptable for ground transportation associated with the air shipment. When reusing packaging, all inappropriate marks and labels that refer to dangerous goods must be removed. Cross out labels and marks if they cannot be removed. Reused packaging must comply with the package strength requirements. Contact a Dangerous Goods Advisor before reusing any packaging.

5.6.1 Packaging

In general, shippers are responsible for ensuring that packaging used is suitable for shipping hazardous materials. For instance:

- Packaging selected must conform to DOT specifications and be marked with the appropriate packaging code. Packaging selected for air transportation must be those specified in the IATA Dangerous Goods Regulations and must display the appropriate packaging code.
- Each package must be designed, constructed, maintained, filled, and closed so that there are no releases of hazardous materials.

- Packages are to be compatible with the materials they contain particularly with respect to corrosivity, permeability, softening, premature aging, embrittlement and chemical reaction.
- When filled with liquid, sufficient space (outage) is to be allowed for temperature related expansion of the liquid.
- Mixing of incompatible materials in the same package, freight container, or overpack is forbidden.

For clarification on this last bullet, inner packages that are placed in the same outer packaging must not contain substances that can react with each other or with dangerous goods that require segregation. For example, you must not ship an acidic corrosive material, such as nitric acid, with an alkaline corrosive, such as sodium hydroxide, because the two items will react violently if mixed together. The absorbent or cushioning material must not react with or be affected by the contents of the inner packages if the contents leak into the absorbent or cushioning material. Inner packages must be packed, secured, or cushioned in a way that prevents breaking or leaking and that controls movement of the inner containers within the package during normal conditions of shipping.

A DOT-trained employee must open, inspect, and repack, if necessary, any hazardous material package prepared by an untrained person.

In addition to these general packaging requirements, there are specific requirements for each hazard class and additional requirements for packaging depend on the mode of transport (air, motor vehicle, and rail).



Aircraft: Cushioning material, absorbent material or an inner liner may be required during air transportation in an outer packaging able to withstand the normal conditions of transport. They cannot break, be punctured, or leak their contents into the outer packaging. Contact your Dangerous Goods Advisor to determine if additional material is required. In addition to these general packaging requirements, the IATA DGR specifies a Packing Instruction for each dangerous good. These packing instructions are incorporated into the instructions obtained from the HazMat ShipRight tool. Contact a Dangerous Goods Advisor for specific IATA packaging requirements and limits not provided in the HazMat ShipRight tool.

5.6.2 Marking

Each package must be *marked* with the following information: the proper shipping name of the contents, with the appropriate technical name (if applicable) in parentheses, and the letters RQ if a CERCLA-reportable quantity of a hazardous substance is present in the package; the corresponding UN identification number; and the name and address of the shipper and the recipient. If more than one package is included in the same air shipment, the net quantity of the hazardous materials contained in the package must be marked next to the shipping name and ID number.



Combination packagings containing liquids must display package orientation arrows on two opposite sides of the package. When you place a package orientation marking

on a package, the words “This End Up” or “This Side Up” may be displayed on the top of the package.

Bulk packaging (i.e., liquid volume greater than 119 gallons or solids greater than 882 pounds) has different marking requirements.



5.6.3 Labeling

Hazard labels are diamond-shaped with the hazard class number in the bottom corner of the label. Applicable hazard labels must be placed on the package near the shipping name and marking. Labels needed are specified in the HazMat ShipRight tool or may be determined by Dangerous Goods Advisors. The hazard label identifies the primary hazard of a dangerous good. If there is a subsidiary risk, a label identifying the subsidiary risk must be placed next to the primary label.

5.7 Example Shipping Instructions

Instructions for hazardous materials that are shipped often by CH2M HILL are available from the HazMat ShipRight Tool on the VO. These instructions **must** be followed. The tool should be used for each shipment to ensure that the most recent instructions are used, and that a Dangerous Goods Advisor is notified. Select instructions are also included in **Attachment 2**. Included in the discussion of the procedures for each item is an illustration of a package and its contents. The diagram shows how much each inner receptacle can hold, and shows the marked and labeled completed package.

Included in the procedure for each material is an example of a completed Shipper's Declaration for Dangerous Goods, where applicable. Remember that FedEx Ship Manager must be used to generate the DGD for any shipment sent via FedEx.

If you have questions about a shipment of dangerous goods, contact a Dangerous Goods Advisor.

5.8 Shipping by Highway

This section addresses transportation requirements for shipments prepared by CH2M HILL, but transported by others (e.g., commercial couriers, transportation subcontractors). Transport of hazardous materials by CH2M HILL personnel in company-owned or rented vehicles is discussed in Section 5.9. The following requirements are in addition to Section 5.5 *Transportation Documents* requirements.

5.8.1 DOT Registration Number

Offerors and transporters of certain quantities and types of hazardous materials, including hazardous wastes, are required to file an annual registration statement with the DOT and to pay a fee (see 49 CFR Part 107, Subpart G). This applies to offers or transporters of:

- (1) A highway route-controlled quantity of a Class 7 (radioactive) material
- (2) More than 25 kg (55 lbs.) of a Division 1.1, 1.2, or 1.3 (explosive) material
- (3) More than 1 L (1.06 qt) per package of a material poisonous by inhalation in Hazard Zone A (relates to LC₅₀ limits)

- (4) Hazardous materials in bulk packaging with a capacity equal to or greater than:
- 13,248 L (3,500 gal) for liquids or gases or
 - 13.24 cubic meters (468 cubic feet) for solids
- (5) A shipment in a non-bulk packaging of 2,268 kg (5,000 pounds) gross weight or more of one class of hazardous materials for which placarding of a vehicle is required
- (6) Any shipment that requires placarding

CH2M HILL companies do not routinely maintain a DOT registration number. A Dangerous Goods Advisor must be contacted prior to shipping if any of these quantities are exceeded for a shipment where CH2M HILL, and not our client, is the offeror.

5.8.2 Loading and Unloading

Shippers must comply with loading and unloading requirements that include, but are not limited to:

- No leaking packages, containers or portable tanks may be loaded.
- Packages containing hazardous materials must be secure against shifting or braced restricting movement while in transit.
- Containers having valves must be loaded to minimize damage to the valves.
- Container marked with orientation arrows must be loaded so that they remain in the correct position.
- Smoking is not allowed during loading and unloading of flammable, explosive, and oxidizing materials or compressed gases.
- Handbrakes must be securely set and all other reasonable precautions taken to prevent movement of the vehicle during loading and unloading.
- Tools likely to damage packaging should not be used while loading and unloading.

In addition to these general requirements, DOT established a segregation chart in 49 CFR 177.848 indicating which hazardous materials, based on hazard class, cannot be loaded or transported together. Additional restrictions noted include:

- **Nitric Acid:** Nitric acid (>50% concentration) must not be loaded above any package containing any other material. Nitric acid packages are limited to two tiers high.
- **Batteries, Corrosive:** Batteries containing an electrolyte must be loaded so that the batteries are protected against other cargo falling onto or against them. The battery terminals must be insulated against short circuits.
- **Gas Cylinders:** Gas cylinders must be packed in crates or boxes or must be securely lashed in an upright position. Gas cylinders also may be loaded in a horizontal position on racks or a flat floor or platform if they are secured to prevent movement.

There are additional specific loading requirements for various modes of transport (e.g., air, motor vehicle, and rail).

5.8.3 Placards

A placard is a diamond-shaped symbol measuring 10.8 inches on a side. Placarding on each side and each end of transport vehicles carrying hazardous materials is required to allow emergency personnel to quickly identify the contents of a truck, tanker, or railcar at a distance to determine the appropriate response. It is the responsibility of the shipper to offer the initial transporter the appropriate placards if the transporter does not have them (although most transporters will carry placards). Placard selection is based on the hazard class and the quantity on the transport vehicle. A shipment of hazard class 9 materials does not require a placard for shipments in the U.S., although it must still display the UN identification number. The appropriate UN identification number may also be displayed in the middle of the placard.

5.8.4 Hazardous Waste Transporter ID number

Hazardous waste transporters must comply with the requirements of 40 CFR Part 263, including obtaining an EPA identification (ID) number. EPA ID numbers are required for transporting hazardous waste in the U.S. and are obtained by completing EPA Form 8700-12, Notification of RCRA Subtitle C Activity. If we hire a transporter to haul hazardous waste on our or our client's behalf, we request their EPA ID number in the subcontractor prequalification process (see HSE SOP 215) to evaluate their performance.

5.8.5 Transporter Prequalification

When CH2M HILL hires a subcontractor, including waste transporters, they must be prequalified according to HSE SOP 215, *Contracts, Subcontracts, and HSE Management Practices*. The purpose of subcontractor prequalification is to review their health and safety and environmental performance to limit our liability and protect our reputation.

5.9 Transport in CH2M HILL Vehicles

CH2M HILL's preference is to avoid liability by having hazardous materials shipped from the vendor directly to the project site in amounts that will be consumed during the project or by hiring a licensed, registered, reputable transportation subcontractor. Under certain circumstance small quantities of hazardous materials may be transported in company vehicles, but these situations are limited and written site-specific approvals may be needed in some instances, due to the complexity of the RCRA and DOT regulatory requirements.

If you have questions or concerns about shipping dangerous goods, contact a Dangerous Goods Advisor.

5.9.1 Materials Permitted for Self-Transportation in CH2M HILL Vehicles on Public Roads

During the normal course of fieldwork, CH2M HILL personnel often are required to drive to a site in a company or leased vehicle with the equipment necessary to complete the job. The equipment may contain dangerous goods. Acids for preserving samples, alcohol for decontamination, and gases for calibrating instruments are some of the dangerous goods that we transport by highway on a frequent basis. As such, we must abide by DOT regulations for highway transportation of dangerous goods.

5.9.1.1 Hazardous Materials—Materials of Trade Exception

The materials of trade exception in the DOT Hazardous Materials Regulations (49 CFR 173.6) allows firms whose principal business is not hazardous materials transportation to self-transport limited quantities of certain hazardous materials in support of their principal business activities, with relatively few requirements. This exception applies to the following materials that could potentially be found on CH2M HILL projects:

- **Flammable and non-flammable compressed gasses** (Division 2.1 and 2.2). These include welding gasses such as oxygen and acetylene, calibration gasses for field instruments, compressed air, and nitrogen. The gross weight of a single cylinder cannot exceed 220 pounds.
- **Flammable liquids** (Class 3). These include gasoline, diesel fuel, and flammable solvents such as acetone, hexane, methanol, lacquer thinner, and paint thinner. The maximum package size for these and most other flammable liquids is 8 gallons. Certain high-hazard liquids are limited to a package size of 1 pint (Packing Group I materials).
- **Oxidizers** (Division 5.1). These include hydrogen peroxide solutions (60% or less), and potassium permanganate. The maximum package size for these and most other oxidizers is 8 gallons or 66 pounds. Certain high-hazard materials are limited to a package size of 1 pint or 1 pound (Packing Group I materials).
- **Corrosives** (Class 8). These include acids such as hydrochloric, nitric, and sulfuric acids, including those used for sample preservatives and pre-preserved sample bottles, and alkaline materials like sodium hydroxide and potassium hydroxide. The maximum package size for these and most other corrosives is 8 gallons or 66 pounds. Certain high-hazard materials, including very concentrated acids, are limited to a package size of 1 pint or 1 pound (Packing Group I materials).

These materials of trade can be transported in CH2M HILL vehicles, if the following requirements are met:

- Do not exceed 200 kg (440 pounds) aggregate gross weight for all materials of trade.
- The material must be packed in the manufacturer's original packing, or a packing of equal or greater strength and integrity. If the material was shipped by FedEx to a hotel or other pickup location, keep the material in all of the original packaging during transportation.
- Gasoline containers must be made of plastic or metal and must be an OSHA-approved or DOT-specification container.
- Packaging must be:
 - Leak-tight for liquids and gases, and silt-proof for solids
 - Securely closed
 - Protected against damage and secured in the vehicle
- The package must be marked with the name of the material it contains and the letters “RQ” if it contains greater than the CERCLA reportable quantity. Compressed gas

cylinders must have the manufacturer's original labels, including the DOT hazard class label.

- The operator of the vehicle must be informed of the presence of the materials, their hazards, and the conditions of the materials of trade exception.

The materials listed above can be transported in company vehicles without obtaining the site-specific approval described in Section 5.9.3.1. Contact a Dangerous Goods Advisor if you have any questions about whether the material you wish to transport meets these requirements.

The following materials are potentially subject to the materials of trade exception, but aren't usually found on CH2M HILL projects or require a case-specific applicability determination:

- Flammable solids (Division 4.1)
- Poisons (Division 6.1)
- Infectious materials (Division 6.2)
- Environmentally hazardous substances (Class 9)

Site-specific approval must be obtained to transport these materials (see section 5.9.3.1).

Note: The materials of trade exception does **not** apply to any RCRA hazardous waste whose transportation requires a hazardous waste manifest.

5.9.2 Materials Prohibited From Self-Transportation in CH2M HILL Vehicles on Public Roads

Under most circumstances the following materials cannot be self-transported by CH2M HILL:

- Hazardous Waste defined in 40 CFR 261 or the equivalent state regulations.
- Hazardous Materials that are **not** covered by the materials of trade exception described above.
- Hazardous Materials requiring Motor Carrier Safety Permits per 49 CFR 385, Subpart E.

Alternatives and options for the transport of the above items should be sought, such as:

- CH2M HILL hiring a transportation subcontractor to deliver and pick-up the waste or material.
- Determining if the client already has a subcontracted transporter on retainer used for other projects.

Under limited extenuating circumstances site-specific approval or leadership approval may be obtained to self-transport these materials, as described in Section 5.9.3.

5.9.3 When Are Written Site-Specific Determinations and Approvals Needed for Transportation?

In the following cases it may be possible for CH2M HILL to self-transport certain hazardous materials or hazardous wastes under a regulatory exemption or exclusion. Due to the complexity of the regulatory requirements a site-specific written determination that an

exclusion or exemption applies must be obtained from the Business Group Environmental Manager and a Dangerous Goods Advisor. They and the Project Manager must elevate the issue for written leadership approval as described in Section 5.9.3.2, if the situation falls outside the exclusion or exemption circumstance.

5.9.3.1 Site-Specific Determination

Contact the Business Group Environmental Manager and Dangerous Goods Advisor if the following situations apply to your project:

- **Materials of Trade Exception.** Transportation of limited quantities of hazardous materials under the materials of trade exception other than those specifically authorized in Section 5.9.1.1.
- **Hazardous Waste Contiguous Property Transportation.** Hazardous wastes must be accompanied by a hazardous waste manifest during offsite transportation, in accordance with 40 CFR Part 262 Subpart B. Hazardous waste transporters must comply with the requirements of 40 CFR Part 263, including obtaining an EPA ID number. However, crossing a public road at a right angle to travel between contiguous properties owned by the same person is not off-site transportation, and therefore does not trigger these requirements. In addition, hazardous waste can be transported without a manifest, and without triggering the hazardous waste transporter requirements, “on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way (40 CFR 262.20(f)).” Because the applicability of these exemptions depends on narrow site-specific circumstances, and they are not applicable in all states, a site-specific determination is required before hazardous waste is transported under these exemptions.
- **Conditionally Exempt Small Quantity Generator Sites.** If hazardous waste generation at an offsite location, such as an offsite monitoring well, does not exceed 100 kg (around 26 gallons) per month, it may be regulated as a conditionally exempt small quantity generator (CESQG) under 40 CFR 261.5, and it may be possible for CH2M HILL to self-transport limited quantities of hazardous waste from this location. Some states do not recognize these provisions.
- **Operating Large Vehicles or Vehicle-Trailers Combinations in Intrastate Commerce.** Some states impose the DOT motor carrier safety requirements on vehicles operated in intrastate commerce, but may use a gross vehicle weight limit threshold higher than 10,000 pounds. Vehicles or vehicle-trailer combinations with gross vehicle weight ratings higher than 10,000 pounds should not be operated in intrastate commerce until it is verified that motor carrier safety regulations will not be triggered. CH2M HILL does not have such a program in place and cannot operate vehicles or vehicle combinations that exceed this weight rating limit.
- **Applicability to Offsite Management of Environmental Media.** CH2M HILL periodically generates investigation-derived waste (IDW) and remediation waste, such as drill cuttings and purge water, at locations separate from our client’s sites, to investigate and monitor offsite pollutant migration or for other purposes. If these remote locations are accessible to the public it may be necessary to immediately transfer

these materials from the point of generation to a secure location. Non-hazardous, non-DOT regulated materials may be self-transported as long as the vehicle weight limits specified above are not exceeded. CH2M HILL cannot self-transport these materials if they are DOT-regulated hazardous materials or hazardous waste not eligible for an exception or exclusion above, unless written leadership approval is obtained.

5.9.3.2 Approvals

In limited cases, CH2M HILL may make a risk management decision to transport materials that fall outside the exceptions and exclusions discussed above. This may require compliance with additional regulatory or insurance requirements. Written approval must be obtained from the Business Group Environmental Manager prior to transporting any hazardous material/waste not specifically approved in Section 5.9.1 and 5.9.3.1. The BGEM will consult a Dangerous Goods Advisor and BG Risk Manager before providing the approval. All approvals will be maintained in project files.

5.9.4 Motor Carrier Safety Regulations

Operation of a single vehicle, or a vehicle-trailer combination with a combined gross vehicle weight rating greater than 10,000 pounds on a highway in interstate commerce requires compliance with DOT motor carrier safety regulations for commercial motor vehicles. These requirements are triggered by the gross vehicle weight rating (GVWR) of the truck or truck and trailer combination, not the actual weight of vehicle, trailer, or contents. For example, the GVWR of a Ford F350 pickup truck ranges from 10,300 to 13,000 pounds. A Ford F150 pickup truck is rated from 6,400 to 8,200 pounds. The weight rating of a towed trailer is added to the weight rating of the truck to calculate the GVWR of the truck-trailer combination. Because CH2M HILL does not have a motor carrier safety program in place, vehicles/combinations that exceed this 10,000 pound limit must not be used in interstate commerce. Some states impose these or similar requirements on vehicles used in intrastate commerce. Before using a vehicle that exceeds this limit in intrastate commerce, you must contact a Dangerous Goods Advisor to determine if state-specific requirements apply.

5.9.5 Accident and Incident Preparation and Notification

If CH2M HILL is transporting hazardous material in our vehicles, we must also have appropriate spill containment and cleanup materials in the vehicle. The size and capacity of the spill kit will depend on the material being transported. For instance, for liquids, adsorbent rags and booms, gloves and a bucket with a sealable lid may be sufficient. When transporting solid materials, a broom, dust pan, gloves, and secure bucket are essential. Consult the Material Safety Data Sheet for specific material cleanup procedures prior to transport.

When a spill or leak occurs while in transit, consult the MSDS or Emergency Response Guide reference number and clean-up the spill only if it is safe and you have been trained to do so. Call 9-1-1 if the spill is beyond your capabilities and poses a hazard to the public, workers, or other vehicles. Incidents are to be reported in the CH2M HILL Hours and Incident Tracking System (HITS) in accordance with HSE SOP 111, *Incident Notification, Reporting, and Investigation*.

The Hazardous Materials Regulations require certain types of incidents be reported to the U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA). Section 49 CFR

171.15 of the regulations requires an immediate telephonic report (within 12 hours) of certain types of hazardous materials incidents. Section 171.16 requires a written report for certain types of hazardous materials incidents within 30 days of the incident, and a follow-up written report within one year of the incident, based on certain circumstances.

5.9.6 Tunnels

Regulations for transporting dangerous goods through vehicular tunnels used for mass transportation are established and published under the authority of the state or the local municipality. If your route includes tunnels, contact the local branch of the state highway police before you begin your trip to ask if the dangerous goods you need to transport are allowed in the tunnels.

6.0 Training Requirements

The DOT requires employees involved with hazardous material transport (hazardous waste is a hazardous material) to be trained [49 CFR 172 Subpart H]. CH2M HILL employees involved in the following activities related to hazardous materials must take the online [Dangerous Good Shipping training](#):

- Loading or unloading a truck
- Selecting, purchasing, or handling any shipping container, including totes or drums
- Preparing, reviewing or signing waste profiles, shipping papers, or manifests
- Labeling containers before transport
- Driving vehicles transporting hazardous materials.

Initial training is required prior to performing these functions and recurrent or refresher training is required at least once every three years according to the regulations. CH2M HILL is more stringent than the regulations and requires recurrent training every two years. Employees are responsible for completing their refresher training on schedule.

Documentation of taking CH2M HILL online courses can be found on the VO under Employee Connect or in the HSE [HandS training database](#). The online CH2M HILL Dangerous Good Shipping training is basic awareness training tailored for shipment of common hazardous materials. It is not a full curriculum addressing all DOT requirements. A CH2M HILL Dangerous Goods Advisor must be consulted when shipping or transporting any hazardous material that does not have specific instructions in the HazMat ShipRight tool.

If written leadership approval is needed for transport in CH2M HILL vehicles, then there may be additional training requirements. For instance, drivers or carriers of hazardous materials must comply with training requirements in 49 CFR 177.816 pertaining to vehicle inspections and operations as well as securing loads. Any person who operates a cargo tank or vehicle with a portable tank with a capacity of 1,000 gallons or more must also have the appropriate state-issued commercial driver's license required by 49 CFR 383 and comply with other motor carrier safety training and skill requirements (49 CFR 325, 386, 387, 390-393, 395-397 and 399).

7.0 Forms, Permits and Checklists

Hazardous Material Registration Statement Form, DOT F 5800.2

Hazardous Materials Incident Report Form, DOT F 5800.1

EPA Form 8700-12 Notification of RCRA Subtitle C Activity

8.0 References

U.S. DOT Hotline 1-800-467-4922

U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration



<http://www.phmsa.dot.gov/hazmat/about>

9.0 Attachments

Attachment 1 [Transportation Security Plan](#)

Attachment 2 [Example Shipping Instructions](#)

10.0 Approval

Revision	Date	Description	Prepared By	Approved By:
1.0	06/11/2008	Revised to Standard Operating Procedure	Jim Kelly	
2.0	08/30/2012	Revised consistent with U.S. Department of Transportation regulatory changes and changes to our Dangerous Goods Shipping program	John Blasco Jim Kelly	

Transportation Security Plan

Purpose and Objectives

This plan implements CH2M HILL's strategies for hazardous material transportation security management in accordance with U.S. Department of Transportation (DOT) regulations in 49 CFR 172, Subpart I, *Safety and Security Plans*.

The objectives of this Plan include the following:

- Promote a "risk reduction culture with a security focus" in daily operations
- Partner with law enforcement agencies, transporters, emergency responders, and employees in securing hazardous material transportation incidents
- Prioritize security risks and effectively allocate resources
- Take action to reduce security risks that have been identified
- Strive for continuous improvement
- Communicate between stakeholders to ensure that each knows his/her role and is aware of security risk information

This plan evaluates typical risks for CH2M HILL projects. If an individual project requires a transportation security plan, the project will revise this plan as needed to include all security risks presented by the project.

Responsibilities

Enterprise HSE Director

The Enterprise HSE Director is the senior management official responsible for overall development and implementation of the Transportation Security Plan.

Director of Security Operations

CH2M HILL's Director of Security Operations coordinates with the Enterprise Environmental Director regarding hazardous material transportation security management. The Director of Security Operations maintains CH2M HILL's Security/Asset Protection Policy and Manual.

Dangerous Goods Advisors

Advise staff on the DOT regulations and when a project, office and/or facility specific transportation security plan is required. Dangerous Goods Advisors are responsible for annual review of this Plan and revising it to reflect changing circumstances. Dangerous Goods Advisors will coordinate with the Environmental Director regarding future updates/changes to this plan as well as any project related Transportation Security Plans.

Business Group Environmental Manager

Business Group Environmental Managers will support project managers and field or construction project teams advising on environmental and transportation compliance requirements. Prequalify registered hazardous material transporters for use in transporting hazardous materials on behalf of CH2M HILL and our clients per HSE SOP 215, *Subcontracts, Contracts, and HSE Management Practice*.

Project Managers

Project Managers must identify if CH2M HILL is expected to offer hazardous material for transportation subject to the security plan requirements and communicate with the Business Group Environmental Manager and/or Dangerous Goods Advisors. Project Managers are responsible for managing hazardous materials prior to and while they are performing work. They must follow the requirements in this plan as well as any project required Transportation Security Plan.

Contract Administrators (KAs)

KAs will request HSE pre-qualification questionnaire to be completed by potential hazardous material transporters to be subcontracted on behalf of CH2M HILL and our clients per HSE SOP 215, *Subcontracts, Contracts, and HSE Management Practices*.

Safety Coordinator or Construction/Operations Supervisor

The Safety Coordinator or the Construction/Operations Supervisor is responsible for alerting the PM when classes and quantities of hazardous materials offered require compliance with this Plan.

Enterprise Security

As part of the enterprise Security function, these personnel will help develop and assist with appropriate security plans for your project, office, or facility based on a risk/threat assessment and vulnerability analysis. They also provide the company with country risk overviews, internal investigation services, as well as, crisis-management, workplace-violence, and business-continuity planning.

Regulatory Requirement

Each person who offers for transportation in commerce or transports in commerce one or more of the following hazardous materials must develop and adhere to a transportation security plan for hazardous materials that conforms to the requirements in the regulations 49 CFR 172.800:

1. Any quantity of a Division 1.1, 1.2, or 1.3 (explosive) material
2. A quantity of a Division 1.4, 1.5, or 1.6 (explosive) material requiring placarding in accordance with Sec. 172.504(c)

3. A large bulk quantity of Division 2.1 (Flammable gas) material
4. A large bulk quantity of Division 2.2 (non-flammable compressed gas) material with a subsidiary hazard of 5.1 (oxidizer)
5. Any quantity of a material poisonous by inhalation, as defined in 49 CFR 171.8
6. A large bulk quantity of a Class 3 (Flammable and combustible liquid) material meeting the criteria for Packing Group I or II
7. A quantity of a desensitized explosives meeting the definition of a Division 4.1 (flammable solid) or Class 3 material requiring placarding in accordance with 49 CFR 172.504(c)
8. A large bulk quantity of a Division 4.2 (Spontaneously combustible) material meeting the criteria for Packing Group I or II
9. Any quantity of a Division 4.3 (Dangerous When Wet) material
10. A large bulk quantity of a Division 5.1 (Oxidizer) material in Packing Groups I and II; perchlorates; or ammonium nitrate, ammonium nitrate fertilizers, or ammonium nitrate emulsions, suspensions, or gels
11. Any quantity of organic peroxide, Type B, liquid or solid, temperature controlled
12. A large bulk quantity of Division 6.1 (Poisonous) material (for a material poisonous by inhalation see paragraph (5) above)
13. A select agent or toxin regulated by the Centers for Disease Control and Prevention under 42 CFR part 73 or the United States Department of Agriculture under 9 CFR part 121
14. A quantity of uranium hexafluoride requiring placarding under 49 CFR 172.505(b)
15. International Atomic Energy Agency (IAEA) Code of Conduct Category 1 and 2 materials including Highway Route Controlled quantities as defined in 49 CFR 173.403 or known as radionuclides in forms listed as RAM-QC by the Nuclear Regulatory Commission
16. A large bulk quantity of Class 8 (corrosive) material meeting the criteria for Packing Group I.

Note that “large bulk quantity” refers to a quantity greater than 3,000 kg (6,614 pounds) for solids or 3,000 liters (792 gallons) for liquids and gases in a single packaging such as a cargo tank motor vehicle, portable tank, tank car, or other bulk container.

Transportation Security Risk Assessment

This section has been prepared specifically to meet the requirements of 49 CFR 172.802(a) for an assessment of possible hazardous materials security risks for operations at CH2M HILL. The regulations require the Plan to include an assessment of transportation risks from shipments of the hazardous materials listed in 49 CFR 172.800, including site-specific or location-specific risks associated with facilities where hazardous materials are prepared for transportation, stored, or unloaded incidental to movement.

CH2M HILL facilities consist primarily of office buildings with employees who manage a variety of consulting, design, construction and operation projects, and program management for government, civil, industrial and energy clients. Most of the firm's potential hazardous material transportation risks stem from our client-based construction, operation, field investigation and environmental remediation projects where hazardous materials are used or hazardous wastes are generated. Typical consulting, design and engineering services projects do not involve shipping, receiving or using of hazardous materials. The following risk evaluation is presented by Business Group with some specific CH2M HILL facility operations mentioned separately.

Risks are defined to be consistent with CH2M HILL's Security Asset Protection Manual (Section 2.2) (available on the Virtual Office) and are defined using this model:

- (a) An Extreme risk indicates an event will probably occur.
- (b) A High risk indicates an event is expected to occur.
- (c) A Medium risk indicates an event may or may not occur.
- (d) A Low risk indicates an event, although slightly possible, will not occur.

EXHIBIT 1-1
Assessment of CH2M HILL Transportation Risks
HSE SOP 417 Hazardous Material Transportation

Operations	Security Evaluation	HazMat Security Risk
Energy & Chemicals	Small quantities of hazardous waste are generated from project based operations and a fabrication shop. Types and quantities of hazardous waste do not trigger Transportation Security Plan requirements.	Low-projects only
Environmental Services	Projects generate hazardous remediation waste that is containerized and labeled. Shipping arrangements are made on behalf of clients at field investigation and remediation sites. Most remediation sites are secured by fencing. Types and quantities do not usually trigger Transportation Security Plan requirements.	Low-projects only
Government,	Joint venture programs/projects typically have a	Low-projects

EXHIBIT 1-1

Assessment of CH2M HILL Transportation Risks

HSE SOP 417 Hazardous Material Transportation

Facilities, & Infrastructure	formal HazMat program and site-specific transportation security plans.	only
Industrial & Advanced Technology	I&AT projects are primarily consulting, design and engineering based projects. A few construction projects may exist and they rarely offer or ship hazardous materials.	Low-projects only
Nuclear	Joint venture programs typically have a formal HazMat program and site-specific transportation security plans due to the nature of the hazardous materials included on these programs.	Medium-major programs
Operation and Maintenance	Projects receive chemicals for use in water and wastewater treatment plants. These chemicals are not considered hazardous materials requiring a transportation security plan. Projects rarely offer or ship hazardous materials.	Low-projects only
Power	Power projects are primarily consulting, design, engineering, procurement and construction based projects. They work with clients to build new facilities as well as to re-power, upgrade and modify existing plants. Projects involve crafting long-term strategies while addressing ongoing market challenges-unpredictable and changing electricity demand, transmission capacity constraints, changing environmental regulations and policies, aging infrastructure, outdated technologies, water constraints, and fuel diversification. Construction projects exist, which may offer or ship hazardous materials.	Low-projects only
Transportation	Transportation projects include consulting, engineering, construction, operations, and program management in the areas of highway, bridge, transit, aviation, and ports projects. Construction projects exist, which may offer or ship hazardous materials.	Low-projects only
Water	May manage hazardous environmental media (soil and groundwater) during construction on behalf of client, but this is typically done by third-party. Ships small quantities of chemical and hazardous waste from pilot study laboratories. Types and quantities do not usually trigger Transportation Security Plan	Low-projects only

EXHIBIT 1-1

Assessment of CH2M HILL Transportation Risks

HSE SOP 417 Hazardous Material Transportation

	requirements.	
CH2M HILL Office Mail Rooms	Mostly ship and receives non-regulated materials. There are very few hazardous materials shipments from the mail rooms and usually small quantities (<2 pounds).	Low
CH2M HILL Equipment Warehouses (3)	Equipment warehouses ship and receive chemicals related to construction, operation, field investigations and environmental remediation projects. Some storage of hazardous materials, but each warehouse does cleanup and disposal of expired chemicals annually. Mostly limited quantities of cal gases, corrosives, and some oxidizers. Preference is for chemicals to be shipped directly to the project site. Quantities do not trigger Transportation Security Plan requirements.	Low
CH2M HILL Applied Services Lab	This laboratory receives chemicals for laboratory based analytical procedures and soil, water, and bioassay samples for testing. A majority of the chemicals are used in laboratory based analyses. The laboratory does ship laboratory type waste including excess sample material for disposal to commercial treatment, storage and disposal facilities (TSDF). The types and quantities of chemicals and/or samples that are received or shipped are not considered hazardous materials triggering Transportation Security Plan requirements.	Low
CH2M HILL Demilitarization Inc.	CDI transports cleaned and empty Controlled Detonation Chambers to military or client installations for onsite destruction of explosives. Orders of explosives are shipped to installations for just-in-time delivery. They do not typically offer hazardous materials for shipment, except when returning unused detonators, shaped charges, and blasting caps to manufacturers.	Medium-major programs

Based on an assessment of the operations and business groups at CH2M HILL, the following possible hazmat security risks have been identified:

- Project related field investigations, remediation, and/or construction activities that may offer, ship or receive hazardous materials.

- CH2M HILL facility specific operations involving mailrooms, warehouses and/or laboratory type activities may offer, ship and/or receive deliveries of hazardous materials; however types and quantities are limited.
- Separate independent major programs that may offer, ship or receive hazardous materials.

Based on these potential vulnerabilities, this Transportation Security Plan has been developed, which provides actions taken to minimize these risks. These actions are discussed in the following sections.

Reporting Security Issues

Transportation related security issues should be reported to an employee's supervisor. The supervisor will then decide whether to alert the local police at 9-1-1.

Otherwise, contact the enterprise Security program personnel in the event of a suspected or real threat or security breach. CH2M HILL's Security Help Line is (720) 286-3976 or internationally at +1 (720) 286-3976. Call the on-call Serious Incident Manager: (720) 286-4911 or internationally at +1 (720) 286-4911, if the event of a serious security incident.

Transportation security issues should also be reported in the [Hours and Incident Tracking Systems](#) (HITS) in accordance with HSE SOP 111, *Incident Reporting, Notification and Investigation*.

Personnel Security—49 CFR 172.802(a)(1)

The Hazardous Materials Transportation Security Plan is required to identify measures to confirm that the information provided by job applicants hired for positions that involve access to and handling of hazardous materials covered by the Plan is correct. Such confirmation must be consistent with applicable federal and state laws and requirements concerning employment practices and individual privacy.

CH2M HILL Human Resources confirms information provided by job applicants, including applicants whose positions involve access to or handling hazardous materials covered by this Plan. Background screening when appropriate is also conducted by Human Resources.

Project Managers in consultation with the Business Group Environmental Manager and/or Dangerous Goods Advisors are responsible for identifying if their projects may include hazardous materials transportation and require a separate transportation security plan. Personnel involved in any hazardous material transportation are required to:

- Follow SOP 417, *Hazardous Material Transportation*
- Use the [HazMat ShipRight](#) tool for shipping description and packaging guidance
- Take the online [Dangerous Goods Shipping training](#) which incorporates security threat awareness.

Employees are encouraged to report suspicious incidents or events to the firm's Security program under Enterprise Delivery Excellence. Project Manager's are also encouraged to read CH2M HILL's *Security Asset Protection Manual* available on the VO.

Hazardous materials are not allowed to be stored in our offices because of employee safety and it puts us at risk of violating local fire codes, Occupational Safety and Health regulations, and our office lease agreements.

For major programs, personnel security is the responsibility of the major programs; they typically have extensive requirements due to the nature of their operations.

Unauthorized Access—49 CFR 172.802(a)(2)

The Hazardous Materials Transportation Security Plan must include measures to address the risk that unauthorized persons might gain access to the hazardous materials covered by the Plan.

CH2M HILL employees are required to wear their badge in a visible location while working at CH2M HILL property, such as our offices, according to the Security and Asset Protection Policy. Access to our offices is restricted for individuals who do not have a badge. Office receptions require visitors to sign in and out while in our buildings and wear a provided Visitor badge. Security guards are not common at CH2M HILL offices, unless the office park or building provides this service. Some office complexes or buildings do have security cameras, maintained by the landlord.

Individual project sites may hire security guards, use cameras, or install fencing depending on project location, safety considerations, and equipment stored overnight.

Shipments and deliveries at our offices are managed through the office Mail Room, and managed by Receptionists in smaller offices. When shipping non-regulated materials employees use the onsite shipping tool called CHExpress. When shipping hazardous materials employees must use the HazMat ShipRight tool as mentioned above to assist with identification of proper shipping description and packaging requirements.

The three CH2M HILL equipment warehouses and Applied Services Laboratory, ship and/or receive limited quantities of hazardous materials. Each location has a full time manager who restricts access to the building and locks the facility when not in attendance.

CH2M HILL Demilitarization Inc. is a separate independent major program, with operations that are highly regulated by the Department of Justice's Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). CH2M HILL Demilitarization Inc. prepares site-specific Transportation Security Plans, as needed. Kevin Lombardo/WDC is to be contacted for further information.

Other separate independent major programs are responsible for evaluating their operations to determine if a program-specific transportation security plan is needed, then developing and implementing the appropriate transportation security plan. Typically, these major programs work for the Department of Energy and have their own formal HazMat programs and comprehensive security programs.

En Route Security—49 CFR 172.802(a)(3)

Under the DOT regulation, the Hazardous Materials Transportation Security Plan must address the security risks associated with hazardous material shipments en route from origin to destination, including shipments stored incidental to movement.

En route security is primarily the responsibility of the transporters hired under subcontract agreements and beyond CH2M HILL's control. CH2M HILL requires HSE SOP 215, *Subcontracts, Contracts, and HSE Management Practices* to be followed prior to hiring transportation subcontractors in order to manage risk and ensure the firm hires reputable companies. CH2M HILL does not usually self-transport hazardous materials other than some small quantities under the materials of trade exception (49 CFR 173.6) and other hazardous materials with approvals granted in the Transportation Core Standard and SOP 417, *Hazardous Materials Transportation*.

CH2M HILL uses carriers such as Federal Express, United Parcel Service or the U.S. Postal Service for the majority of our non-regulated, office-related business shipments.

For major programs, specialized transporters are hired to meet the specific needs of the program. DOJ's ATF and DOE specific en route security requirements are the responsibility of these major programs and are beyond the control of CH2M HILL.

Training

The DOT regulation requires training for all hazmat employees. A hazmat employee is defined in 49 CFR 171.8 as an individual employed on a full-time, part-time or temporary basis by a hazmat employer who, during the course of employment is responsible for:

- Determining whether a material is regulated as a hazardous material
- Selecting packaging for hazardous materials
- Preparing hazardous materials for transportation
- Preparing and/or reviewing the shipping papers or hazardous waste manifest
- Signing the hazardous materials certification on shipping papers
- Placing hazardous materials placards, markings, or labels on vehicles or packages
- Loading, unloading, or handling hazardous materials during transportation
- Testing, reconditioning, repairing, modifying, or marking containers for use in hazardous materials transportation
- Operating a vehicle used to transport hazardous materials.

Basic security awareness training is incorporated into the CH2M HILL online hazardous materials training course titled [Dangerous Goods Shipping](#) training. This course includes instruction to make employees aware of security risks associated with hazardous materials transportation and how to respond to possible security threats as required by 49 CFR

172.704(a)(4). Records of employees taking this training are available through the HSE [HandS](#) training database or via Employee Connect on the Virtual Office.

In-depth security training is required for each hazmat employee in situations necessitating a Transportation Security Plan. The in-depth training will, at a minimum, address this Plan and its implementation.

CH2M HILL Demilitarization Inc., as a separate independent major program, has operations that are highly regulated by the Department of Justice's Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) and requires specialized explosive materials training for anyone handling, managing or preparing for shipment these specific hazardous materials. Kevin Lombardo/WDC is to be contacted for further information.

The other separate independent major programs, under the Department of Energy, require specialized radioactive materials training for anyone who handles, manages or prepares for shipment these specific hazardous materials.

Example Shipping Instructions

The following individual instructions are printed from the HazMat ShipRight tool. For the most current version of the instructions, go to the tool on the Virtual Office under Operations > Health, Safety, and Environment > Tools & Forms > HazMat ShipRight Tool

Instructions for AED with Lithium Battery

Instructions for Aviation Fuel

Instructions for Calibration Gas

Instructions for Compressed Air

Instructions for Corrosive Liquid, Acidic, Inorganic Samples

Instructions for Corrosive Liquid, Basic, Inorganic Samples

Instructions for Corrosive Liquid, Toxic Sample

Instructions for Diesel Fuel

Instructions for Dry Ice (Carbon Dioxide, Solid)

Instructions for Environmental Samples

Instructions for Flammable Liquid Samples

Instructions for Flammable Liquid, Corrosive Samples

Instructions for Flammable Liquid, Toxic Samples

Instructions for Formaldehyde Solution (Flammable)

Instructions for Formaldehyde Solution (with not less than 25% formaldehyde)

Instructions for Hydrochloric Acid Preservative

Instructions for Hydrochloric Acid

Instructions for Hydrogen

Instructions for Isopropanol (for use with Porta-Count Fit Test Machines)

Instructions for Isopropanol (Isopropyl Alcohol)

Instructions for Ludlum Instrument

Instructions for Methanol

Instructions for Nitric Acid Preservative (with not more than 20% nitric acid)

Instructions for Radioactive Samples (Excepted Quantity)

Instructions for Sodium Hydroxide, Solid (Excepted Quantity)

Instructions for Sodium Hydroxide, Solid (Limited Quantity)

Instructions for Sulphuric Acid Preservative (>51% solution, Excepted Quantity)

Instructions for Sulphuric Acid Preservative (< or =51% solution, Excepted Quantity)

Cardiac Science AED Units

Highway Shipping Instructions

January, 2012

Instructions for Shipping Cardiac Science Powerheart AED G3 Automated External Defibrillator (AED) Containing Intellisense Lithium Metal Battery by Highway



**LITHIUM BATTERIES -
FORBIDDEN FOR TRANSPORT
ABOARD AIRCRAFT AND VESSEL**

L415 LABELMASTER® (800) 621-5808 www.labelmaster.com

These instructions assume that **one** Cardiac Science Powerheart AED G3 AED unit containing its Intellisense Lithium battery is being shipped by highway. The maximum gross weight of the package must not exceed 66 pounds.

Leave the battery in place inside the AED unit. Package the unit securely in a strong box able to withstand rough handling during transportation. The outside of the box must be labeled with the words “LITHIUM BATTERIES-FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL” on a background of contrasting color, in letters at least 0.25 inches tall. You can write this on the package; you don’t need to purchase a label. However, labels are available from Labelmaster.

Nothing else is required for this shipment.

For questions or additional information call a Dangerous Goods Advisor: John Blasco/BAO (707-827-3614) or Rob Strehlow/MKE (800-609-2426).

Cardiac Science AED Units

Air Shipping Instructions

January, 2012

Instructions for Shipping Cardiac Science Powerheart AED G3 Automated External Defibrillator (AED) Containing Intellisense Lithium Metal Battery by Air



These instructions assume that **one** Cardiac Science Powerheart AED G3 AED unit containing its Intellisense Lithium battery is being shipped by air, with the battery installed in the AED unit, and that the AED unit is being shipped alone as a single package. These instructions do not apply if the battery is removed from the unit and shipped in the same box, or if the battery is shipped separately; in those cases contact a Dangerous Goods Advisor (John Blasco/BAO (707-827-3614) or Rob Strehlow/MKE (800-609-2426)).

Training

You must successfully complete online Dangerous Goods Shipping Training before making this shipment. Refresher training is required every 2 years.
Click [HERE](#) to check training status.
Click [HERE](#) to take training.

Packaging

The battery must be installed in the AED unit. The AED unit must be packed in a strong box, capable of withstanding rough handling during transportation. It should be cushioned inside the box and packed securely. The use of UN/DOT specification packaging is not required.

Marking

The following information must be marked on the outside of the package:

LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT

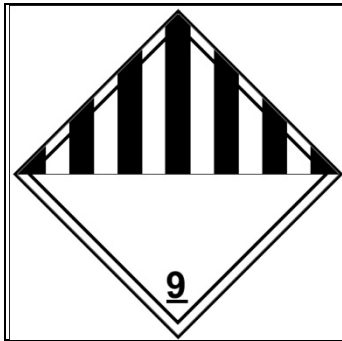
UN 3091

The name and address of the shipper and recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).

Place a Class 9 label next to the shipping name and ID number shown above.



Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Download [FedEx Ship Manager Software](#) or obtain assistance from your mailroom or a Hazmat Advisor to prepare the airbill and declaration.
2. Follow [FedEx General Instructions](#)
3. Enter the following information on the View/Edit Dangerous Goods page in FedEx Ship Manager

Dangerous goods ID: 3091

UN: 3091

of packages: 1

Packing Instruction: 970

Net quantity: 1.0 kg

Type of packing: fiberboard box (plastic, plywood, as appropriate)

Aircraft type: Passenger and cargo

Authorization: No entry for this field

Highlight Lithium Metal Batteries Packed With Equipment in the Proper Shipping Name section.

Click "Add to Shipment."

Make sure that the description of the shipment appears in the "Dangerous goods in shipment" section.

Place one sheet of plain paper on top of at least four sheets of the FedEx Form 157205 with red side hatching in the printer that you have designated for Declaration printing.

Click "OK"

The printer will first print the Airbill on the plain paper, and the Declaration on the paper with red side hatching.

For questions or additional information call a Dangerous Goods Advisor: John Blasco/BAO (707-827-3614) or Rob Strehlow/MKE (800-609-2426).

Instructions for Aviation Fuel

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 2.5 liter (L) of product per inner bottle. The total quantity in the outer package cannot exceed 10 L. The maximum gross weight of the completed package must be 30 kilograms (kg) or less (66 lb or less).

Remove or obliterate all irrelevant markings already on the package or overpack.



Inner Packaging

Packing

This is a Packing Group III hazard. The inner bottles must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fiberboard. The bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The maximum gross weight of the completed package must be 30 kg or less (66 lb or less). Use of UN/DOT specification packaging is not required.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the void between all bottles and to fill the outer package.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable Liquid" label:

Fuel, Aviation, Turbine Engine
UN 1863

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Flammable Liquid" label for Class 3 next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Aviation Fuel Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Calibration Gas

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

You may ship up to 75 kilograms (kg) per outer package. Each cylinder contains 0.1 kg.

Packing

The cylinder is an approved shipping package. Because of its size, however, it must be packed in an overpack so that there are surface areas for labels, addresses, and appropriate markings.

The outer package may be a fiberboard box, a plastic case, or other sturdy container.

Cushioning Materials

Use enough filler to prevent movement of the cylinder.

Marking

Mark each package with the following information:

- The proper shipping name, the two highest concentration of hazardous materials in the gas mixture and the corresponding UN number next to the "Nonflammable Gas" label:

Compressed Gas, n.o.s.
(Nitrogen, Oxygen)(for example)
UN 1956

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).





Place a green "Nonflammable Gas" hazard label for Class 2 next to the shipper's or recipient's address.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Calibration Gas Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Compressed Air

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

You may ship up to 75 kilograms (kg) per outer package. Each cylinder contains 1 kg.

Packing

The cylinders must be securely packed in a strong package that will protect the valves and fittings. The outer package may be a fiberboard box, a plastic case, or other sturdy container.

Cushioning Materials

Use bubble wrap or crumpled paper to prevent movement and to cushion the valve.

Marking

Mark each package with the following information:

- The proper shipping name of the contents.
- The corresponding UN number next to the "Nonflammable Gas" label.

Air, Compressed
UN 1002

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).





Place a green "Nonflammable Gas" hazard label for Class 2 next to the shipper's or recipient's address.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Compressed Air Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Corrosive Liquid, Acidic, Inorganic Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 0.5 liters (L) of product per inner bottle with a maximum quantity of 1.0 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a tightly closed rigid plastic or metal receptacle (such as a paint can), which is then filled with asbestos-free vermiculite before being packed in an outer package. Plastic bottles must be packed in a leak-proof liner, plastic ziplock bag or other means of containment. The receptacle must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fibreboard. The bottles must be packed in an upright position in such a manner as to prevent movement or leakage during transport. The completed package may not exceed 66 pounds gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Corrosive Liquid, Acidic, Inorganic, n.o.s. (include chemical names)
UN 3264



- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Corrosive Liquid Acidic Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Corrosive Liquid, Basic, Inorganic Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 0.5 liters (L) of product per inner bottle with a maximum quantity of 1.0 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a tightly closed rigid plastic or non-aluminum metal receptacle (such as a paint can), which is then filled with asbestos-free vermiculite before being packed in an outer package. Plastic bottles must be packed in a leak-proof liner, plastic ziplock bag or other means of containment. The receptacle must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fibreboard. The bottles must be packed in an upright position in such a manner as to prevent movement or leakage during transport. The completed package may not exceed 66 pounds gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Corrosive Liquid, Basic, Inorganic, n.o.s. (include chemical names)
UN 3266



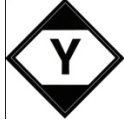
- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Corrosive Liquid Basic Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Corrosive Liquid, Toxic Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 0.5 liters (L) of product per inner bottle with a maximum quantity of 1.0 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a tightly closed rigid plastic or metal receptacle (such as a paint can), which is then filled with asbestos-free vermiculite before being packed in an outer package. The receptacle must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fibreboard. The bottles must be packed in an upright position in such a manner as to prevent movement or leakage during transport. The completed package may not exceed 66 pounds gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Corrosive Liquid, Toxic, n.o.s. (include corrosive and toxic chemical names)
UN 2922
- "PG III" next to the Toxics label



- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place "Corrosive" and "Toxic" labels next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Corrosive Liquid Toxic Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Diesel Fuel

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 2.5 liter (L) of product per inner bottle. The total quantity in the outer package cannot exceed 10 L. The maximum gross weight of the completed package must be 30 kilograms (kg) or less (66 lb or less).



Packing

This is a Packing Group III hazard. The inner container must be made of earthenware, glass, plastic, or metal. The bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The inner container(s) must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fiberboard. The outer package should be at least 14" x 7" x 7". The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Place each inner packaging in a zip lock bag. Use enough asbestos-free vermiculite to completely fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable Liquid" label:

Diesel Fuel
UN 1202

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Flammable Liquid" label for Class 3 next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Diesel Fuel Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Dry Ice (Carbon Dioxide, Solid)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

You may ship up to 200 kilograms (kg) per outer package.

Packing

The package must permit the release of carbon dioxide gas and prevent a build-up of pressure that could rupture the packaging. The outer package may be a fiberboard box. Use of a UN/DOT specification packaging is not required.

Cushioning Materials

Use bubble wrap or crumpled paper to prevent movement.

Marking

Mark each package with the following information:

- The proper shipping name, the UN number and the total net quantity of dry ice next to the Class 9 Hazard label:

Carbon Dioxide, Solid
UN 1845
Total net weight (in kg)
- The name and address of the shipper and the recipient.



Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).

Place a "Class 9 hazard" label next to the shipper's or recipient's address.

The following label incorporates all requirements:

[Class 9 Dry Ice Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online. Fill in the number of packages and net quantity per box next to the dry ice box in the "Special Handling" section on the Airbill. Check the box indicating that the shipment contains dry ice, the number of boxes and total net weight (kg.).

Click [HERE](#) to complete an airbill online.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required when Dry Ice is declared on the Airbill, and it is the only dangerous good in the package.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom.

Provide the client with a copy if sending from the client's address.

Instructions for Environmental Samples

Applicability

These instructions apply to environmental samples that are not regulated as dangerous goods. Check with the Contract Lab for special lab requirements.

Training

Although environmental samples are not regulated as dangerous goods, you are still required under CH2M HILL Policy to successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

There are no quantity limits. However, the Contract Lab may have sample quantity limits.

Packing

Properly identify sample containers before packing. Tape seal each bottle and place in a polyethylene bag. Place the sample in a strong fibreboard box or cooler. The inner and outer packages are not required to be UN/DOT specification packages.

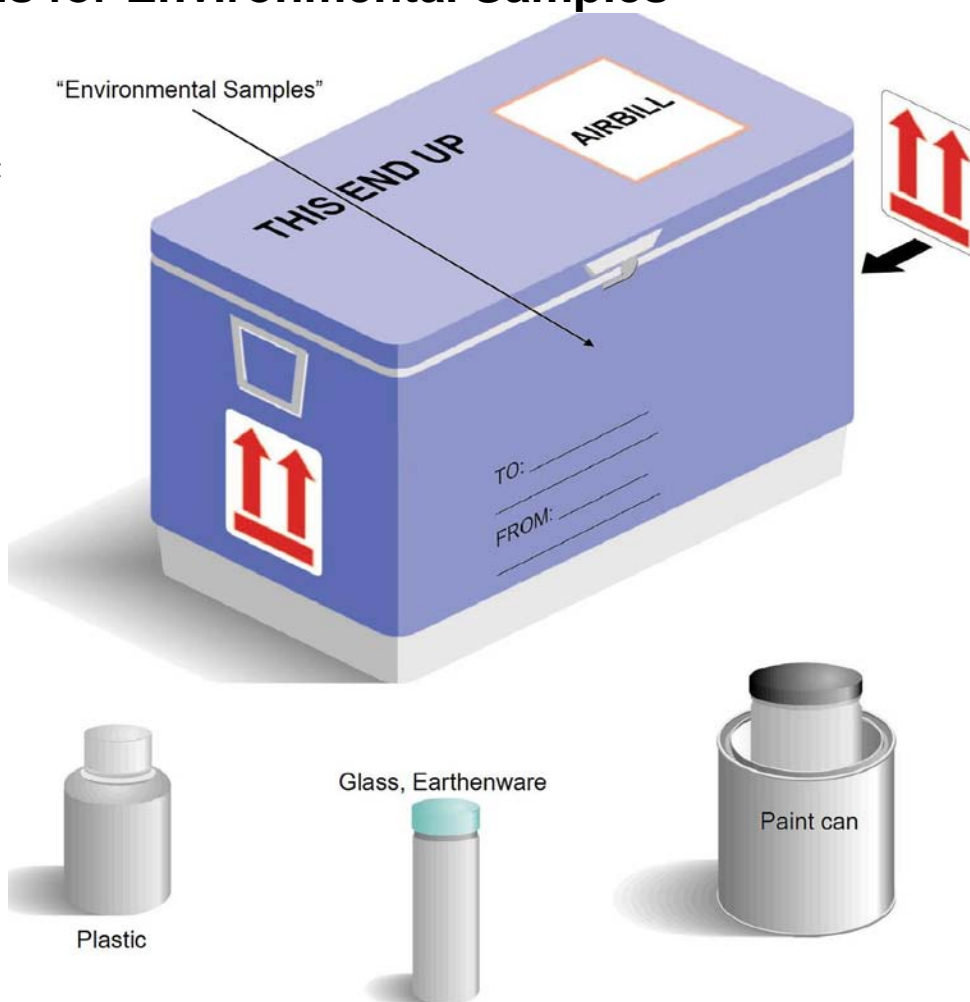
Cushioning Materials

Use sufficient absorbent material to absorb the entire contents. If there are multiple samples, be sure there is sufficient cushioning material between the containers. Secure the box or cooler with strapping tape.

Marking

Samples must have completed identification tags. Mark each package with the following information:

- Environmental Samples
- The name and address of the shipper and the recipient.



Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. No other documentation is required.

Recordkeeping

Maintain copies of all shipping documents, including the exemption letter, for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Flammable Liquid Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a Limited Quantity shipment. You may ship up to 2.5 liter (L) of product per inner bottle with a maximum quantity of 10 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a strong outer packaging (cooler). The bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The completed package may not exceed 30 kilograms (66 lbs) gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable" label:

Flammable Liquid, n.o.s. (include chemical name)
UN 1993

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).





Place a "Flammable" label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Flammable Liquid Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Flammable Liquid, Corrosive Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

This is a Limited Quantity shipment. You may ship up to 1 liter (L) of product per inner bottle with a maximum quantity of 1 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a tightly closed rigid plastic or non-

aluminum metal receptacle (such as a paint can), which is then filled with asbestos-free vermiculite before being packed in an outer package. Plastic bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The receptacle must be packed in a sturdy outer package of solid plastic (e.g., a cooler) wood, or fiberboard. The completed package may not exceed 30 kilograms (66 lbs) gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable" label:

Flammable Liquid, Corrosive, n.o.s. (include flammable and corrosive chemical names)
UN 2924

- The name and address of the shipper and the recipient.



Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place "Flammable Liquid" and "Corrosive" labels next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Flammable Liquid Corrosive Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Flammable Liquid, Toxic Samples

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a Limited Quantity shipment. You may ship up to 2.0 liter (L) of product per inner bottle with a maximum quantity of 2.0 L per outer package.

Packing

This is a Packing Group III hazard. Earthenware or glass inner bottles must be packed in a strong outer packaging (cooler). The bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The completed package may not exceed 30 kilograms (66 lbs) gross weight. The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable" label:

Flammable Liquid, Toxic, n.o.s. (include flammable and toxic chemical names)
UN 1992
- "PG III" next to the Toxic label
- The name and address of the shipper and the recipient.



Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place "Flammable Liquid" and "Toxic" labels next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Flammable Liquid Toxic Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Formaldehyde Solution (Flammable)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 1 liter (L) per outer package. The size of each bottle must be no larger than 1.0 L. You may ship one 1.0 L bottle or two 0.5 L or four 0.25 L bottles. The maximum gross weight of the completed package must be 30 kilograms (kg) or less (66 lb or less).

Packing

This is a Packing Group III hazard.

The inner package must be of glass, earthenware, plastic, or metal.

Earthenware or glass bottles must be packed in a tightly closed metal receptacle (such as a 1-gallon paint can) filled to capacity with asbestos-free vermiculite to prevent breakage and leakage. Other inner packages must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport.

The inner package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 14" x 7" x 7". UN/DOT specification packaging is not required.



Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable Liquid" label:

Formaldehyde Solution, Flammable
UN 1198
- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Flammable Liquid" label for Class 3 next to the shipper's or recipient's address.



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Formaldehyde Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Formaldehyde Solution (with not less than 25% formaldehyde)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 1 liter (L) per outer package. The size of each bottle must be no larger than 0.5 L. You may ship two 0.5-L or four 0.25-L bottles. The maximum gross weight of the entire package must be 30 kilograms (kg) or less (66 lb or less).



Packing

This is a Packing Group III hazard. The inner package must be of glass, earthenware, plastic, or metal. Earthenware or glass bottles must be packed in a tightly closed metal receptacle (such as a 1-gallon paint can) filled to capacity with asbestos-free vermiculite to prevent breakage and leakage. Other inner package must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. The inner package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 14" x 7" x 7". UN/DOT specification packaging is not required.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Formaldehyde Solutions
UN 2209

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Formaldehyde Declaration Instructions](#)

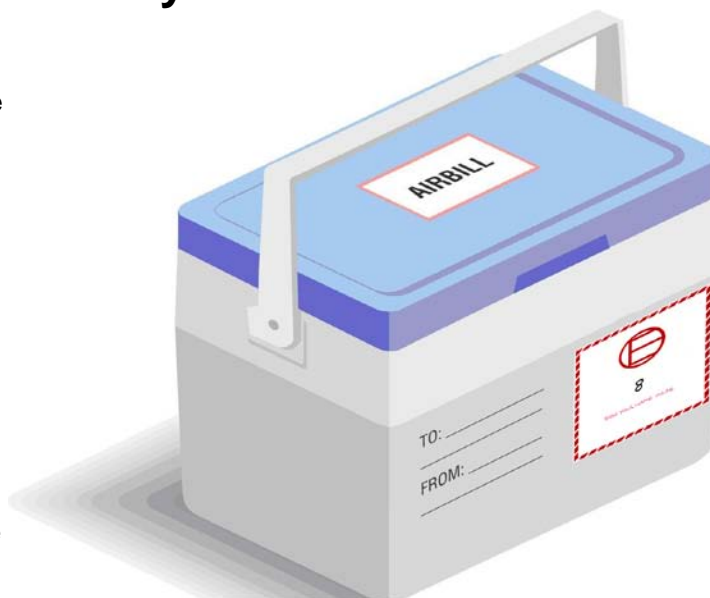
Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

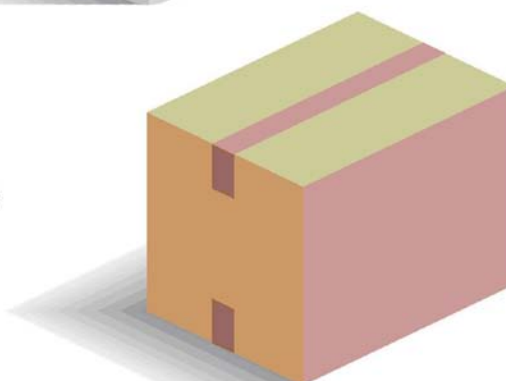
Instructions for Hydrochloric Acid Preservative

Applicability

These instructions only apply to sample containers (e.g., VOA vials) containing hydrochloric acid preservative, before the water sample is added to the container. If the water is not a regulated dangerous good, once it is added to the container with the preservative, the resulting mixture is no longer a dangerous good, and does not have to be shipped in accordance with the dangerous goods procedures.



Glass, earthenware, or plastic ≤ 30ml



Inner Packaging

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is an "Excepted Quantity" shipment. You may ship up to 500 milliliters (ml) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 ml.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You must print the hazard class number (8) on the label and sign your name below the hazard class number.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 8 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Hydrochloric Acid

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship 0.5 liter (L) per outer package. The size of each bottle must be no larger than 0.1 L. You may ship up to five 0.1 L bottles in one package. The maximum gross weight of the completed package must be 30 kilograms (kg) or less (66 lb or less).

Packing

This is a Packing Group II hazard. The inner containers must be of glass, earthenware, or plastic. Each bottle must be packed in a tightly closed non-aluminum metal (such as a paint can) or rigid plastic receptacle, which is then filled with asbestos-free vermiculite before being packed in an outer package. The receptacle must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fiberboard. The outer package should be at least 14" x 7" x 7". The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Hydrochloric Acid
UN 1789



- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Hydrochloric Acid Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Hydrogen

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

You may ship up to 150 kilograms (kg) per package.

Packing

This cylinder is an approved shipping package and can be shipped as is, or it can be placed in an outer packing box (an overpack of fiberboard) so that there are surface areas for labels, addresses, and appropriate markings. A protective cap must be securely attached to protect the cylinder head. Only one cylinder may be in the overpack.

Cushioning Materials

When using an overpack, use enough filler to prevent movement of the cylinder.

Marking

Mark each package with the following information:

- The proper shipping name and the corresponding UN number next to the "Flammable Gas" label:
Hydrogen, Compressed
UN 1049
- The name and address of the shipper and the recipient.

Overpack



Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Flammable Gas" hazard label for Class 2 next to the shipper's or recipient's address.



Place a "Cargo Aircraft Only" label next to the Flammable Gas Label.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Hydrogen Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Isopropanol (for use with Porta-Count Fit Test Machines)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is an "Excepted Quantity" shipment. You may ship up to 500 milliliters (ml) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 ml. The isopropanol used in the Porta-Count Fit Test machines comes from the manufacturer in quantities that meet the quantity requirements.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Write the name and address of the shipper and the recipient on the package. There are no other marking requirements.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You



must print the hazard class number (3) on the label and sign the label under the hazard class number.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 3 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Isopropanol (Isopropyl Alcohol)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship up to 1 liter (L) of isopropanol per outer package. You may ship two 0.5-L or four 0.25-L bottles. The size of each bottle must be no larger than 0.5 L. The maximum quantity in each outer package must not exceed 1.0 L.

The maximum gross weight of the completed package must be 30 kilograms (kg) or less (66 lb or less).

Packing

This is a Packing Group II hazard. The inner container(s) must be of earthenware, glass, plastic, or metal. The bottles must be packed in a leak-proof liner, plastic bag (ziplock) or other means of containment in an upright position in such a manner as to prevent movement or leakage during transport. Place bottles in a sturdy outer package of solid plastic (a cooler), wood, or fiberboard. The outer package should be at least 14" x 7" x 7". The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

Use enough asbestos-free vermiculite to completely fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Flammable Liquid" label:

Isopropanol
UN 1219



- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Flammable Liquid" label for Class 3 next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.

Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Isopropanol Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Ludlum Instrument

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

There is a source supplied with each Ludlum measurement instrument.

Packing

These instruments must be packed in strong, tight packages. The pelican cases provided are sufficient.

Marking

The outside of the inner packaging, or if there is no inner packaging, the inside of the packaging itself, bears the marking Radioactive. This marking must be visible on opening the package. Mark each package with the following information:

- UN 2910
- The name and address of the shipper and the recipient.

Marking

Mark the outside of each package with the following information:

- The name and address of the shipper and the recipient.

Labeling

Place a "Radioactive Material, Excepted Package" label next to the shipper's or recipient's address. You must print the UN number (2910) on the label.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a color printer: [Rad Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from

Instructions for Methanol

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

This is an "Excepted Quantity" shipment. You may ship up to 500 milliliters (ml) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 ml.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

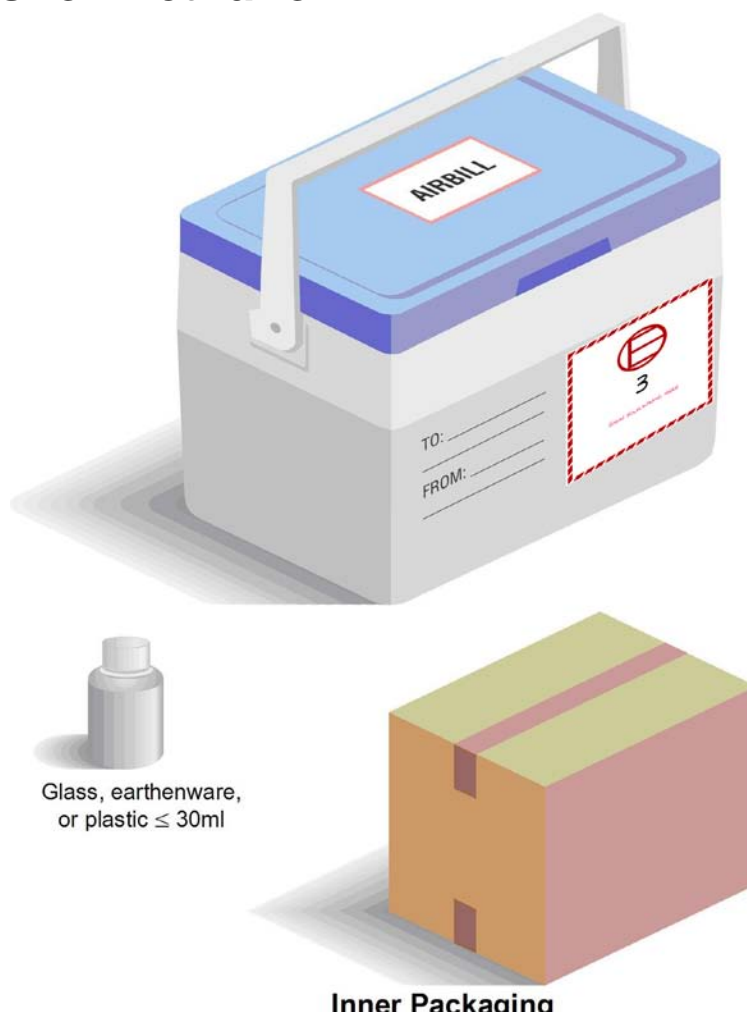
Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Write the name and address of the shipper and the recipient on the package. There are no other marking requirements.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You must enter the hazard class number (3) on the label and sign your name under the hazard class number. A typewritten name is not acceptable -- you must sign your name.





Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 3 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

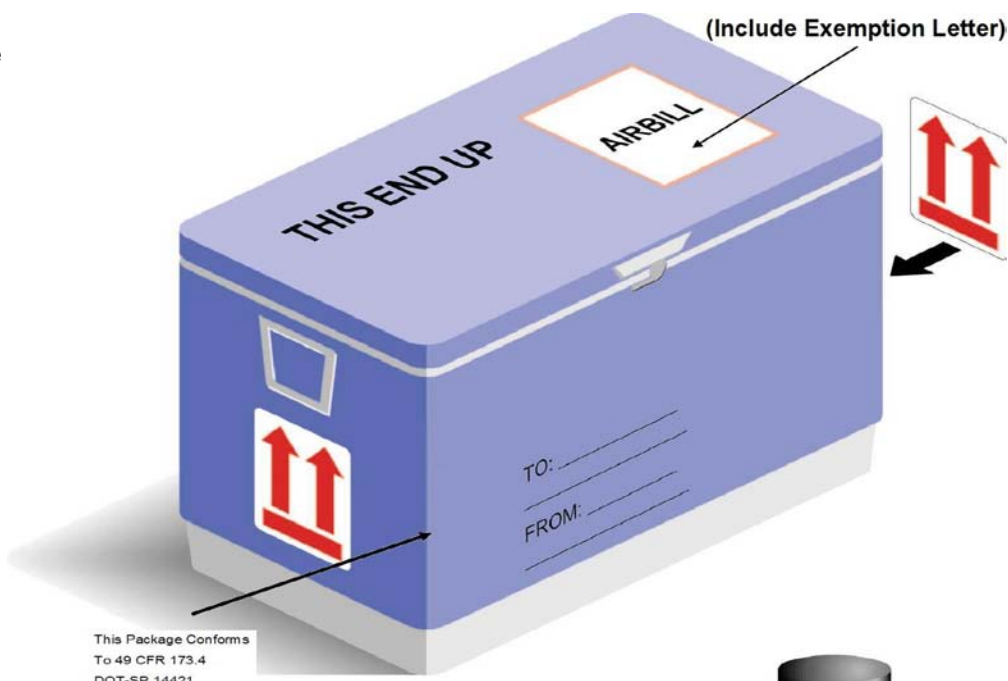
Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Nitric Acid Preservative (with not more than 20% nitric acid)

Applicability

These instructions only apply to sample containers (e.g., VOA vials) containing nitric acid preservative, before the sample is added to the container. Labs may ship small quantities by air, subject to a special DOT approval. The approval allows you to reoffer the shipment as long as no modifications have been made to the package or its contents. You must keep copies of all shipping papers, including the exemption letter.



Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.



Quantity

Laboratories have obtained an exemption to ship nitric acid (other than red fuming, with not more than 20 percent nitric acid, UN 2031) in 1,000 milliliter (ml) plastic sample bottles with not more than 5.0 ml in each container.

Packing

Each bottle is to have a tape seal connecting the closure and the plastic components. No more than 30 containers are to be packed in a plastic cooler. The inner and outer packages are not required to be UN/DOT specification packages. The cooler must be secured with **STRAPPING TAPE**.

Cushioning Materials

Use sufficient absorbent material to absorb the entire contents.

Marking

Mark each package with the following information:

- The following statement and the DOT exemption number:

This Package Conforms to 49 CFR 173.4
DOT-SP 14421

- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required. A copy of the DOT-SP 14421 exemption letter must be included in the pouch with the airbill.

[Nitric Acid Exemption Letter](#)

Recordkeeping

Maintain copies of all shipping documents, including the exemption letter, for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Radioactive Samples (Excepted Quantity)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

Click [HERE](#) to take training.

Quantity

Radioactive material whose activities do not exceed the relevant exception limits listed below may be transported as a limited quantity excepted package. Categorization, labeling, and shipper's declaration are NOT required.

- Solids: 1E^{-3} A2
- Liquids: 1E^{-4} A2

A2 is the activity level of the radionuclide. The radiation level at any point on the external surface of the package must not exceed 0.5 millirem per hour.

The nonfixed (removable) radioactive surface contamination on the external surface of the package must not exceed the following limits:

Contaminant	UCi/cm2 Dpm/cm2	
UCi/cm2 - Dpm/cm2 for Beta-gamma-emitting radionuclides; all radionuclides with half-lives of less than 10 days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228; and thorium-230 when in ores or physical concentrates	1E-5	22
All other alpha-emitting radionuclides	1E-6	2.2

Packaging

These materials must be packed in strong, tight packages that will not leak any of the radioactive materials during normal condition of transportation. A cooler in good condition provides sufficient packaging when used with tightly closed inner bottles cushioned so that they will not break or move.

Cushioning Materials

Use enough filler to prevent the inner containers from breaking or moving.

Marking

Mark the outside of each package with the following information:



- The name and address of the shipper and the recipient.

Labeling

Place a "Radioactive Material, Excepted Package" label next to the shipper's or recipient's address. You must print the UN number (2910) on the label.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Rad Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online. Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Sodium Hydroxide, Solid (Excepted Quantity)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years.

Click [HERE](#) to check training status.

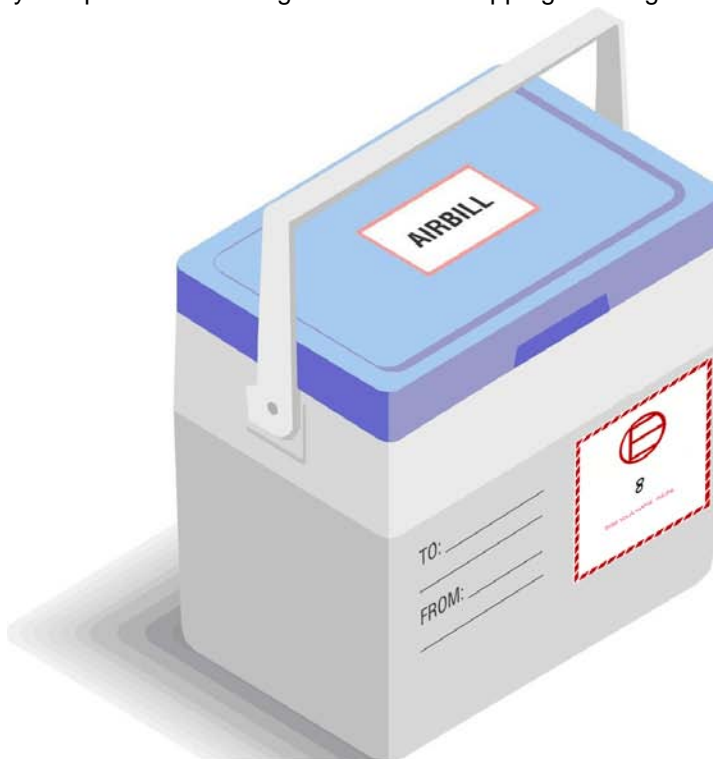
Click [HERE](#) to take training.

Quantity

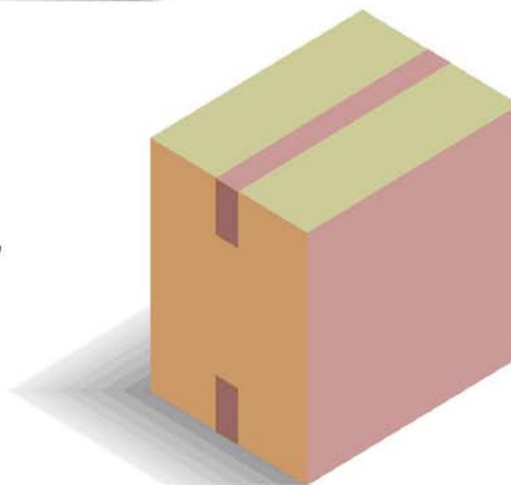
This is an "Excepted Quantity" shipment. You may ship up to 500 grams (g) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 grams.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be



Glass, earthenware,
or plastic $\leq 30\text{ml}$



Inner Packaging

packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Write the name and address of the shipper and the recipient on the package. There are no other marking requirements.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You must enter the hazard class number (8) on the label and sign your name under the hazard class number. A printed name is not acceptable.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 8 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

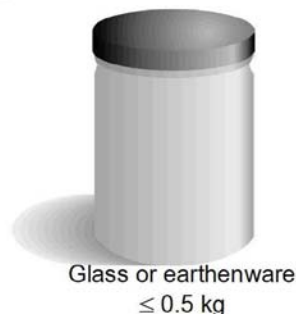
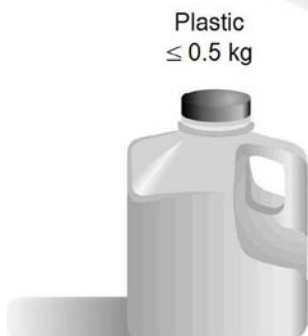
Instructions for Sodium Hydroxide, Solid (Limited Quantity)

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.

Quantity

This is a "Limited Quantity" shipment. You may ship 5 kilograms (kg) per outer package. The size of each inner container must be no larger than 0.5 kg. You may ship up to ten 0.5 kg containers in one package. The maximum gross weight of the completed package must be 30 kg or less (66 lbs or less).



Packing

This is a Packing Group II hazard. The inner containers must be of glass, earthenware, plastic, or metal. The inner container(s) must be packed in a sturdy outer package of solid plastic (a cooler), wood, or fibreboard. The inner and outer packages are not required to be UN/DOT specification packages.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Marking

Mark each package with the following information:

- The proper shipping name of the contents and the corresponding UN number next to the "Corrosive" label:

Sodium Hydroxide, Solid
UN 1823

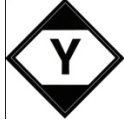
- The name and address of the shipper and the recipient.

Labeling

Obtain labels from your local office mailroom or order directly from [Labelmaster](#).



Place a "Corrosive" Class 8 label next to the shipper's or recipient's address.



Place a "Limited Quantity" label (Y label) next to the hazard class label.



Place the package-position label ("This Way Up") on at least two opposite sides to show the proper package position so that the package is transported upright. This maintains the closure(s) in an upright position.

Airbill and Declaration

FedEx Ship Manager Software must be used to generate the Airbill and Dangerous Goods Declaration for this shipment.

1. Follow these instructions for obtaining [FedEx Ship Manager Software](#)
2. Follow [FedEx General Instructions](#)
3. Follow [Sodium Hydroxide Declaration Instructions](#)

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

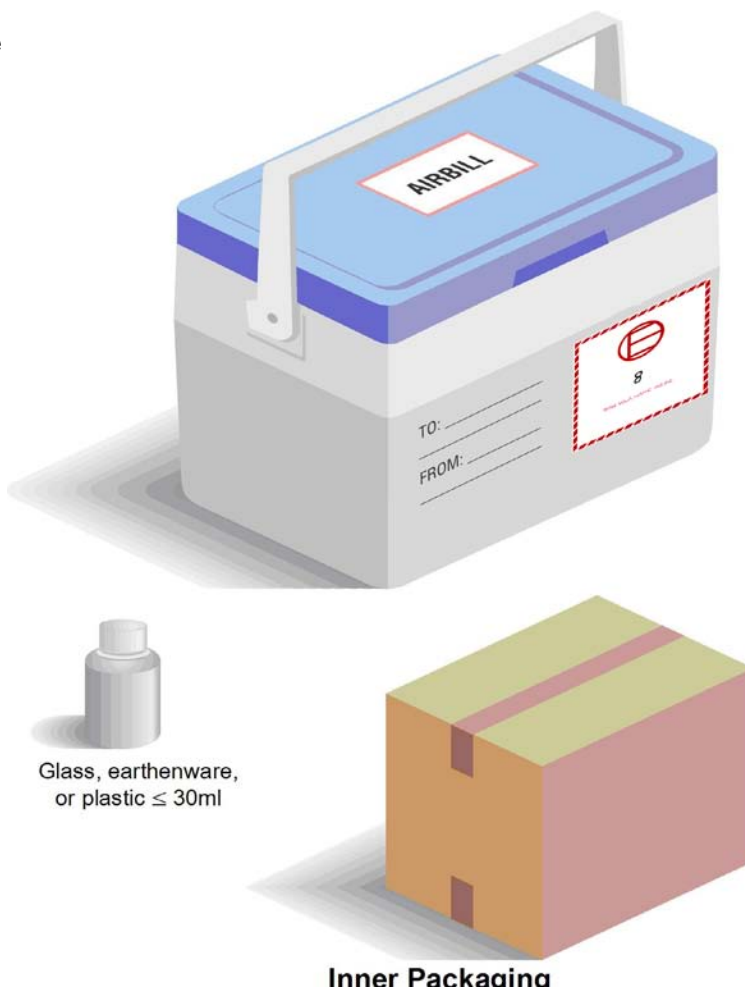
Instructions for Sulphuric Acid Preservative (>51% solution, Excepted Quantity)

Applicability

These instructions only apply to sample containers (e.g., VOA vials) containing sulphuric acid preservative, before the sample is added to the container. If the sample is not a regulated dangerous good, once it is added to the container with the preservative, the resulting mixture is no longer a dangerous good, and does not have to be shipped in accordance with the dangerous goods procedures.

Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE to](#) check training status. Click [HERE](#) to take training.



Quantity

This is an "Excepted Quantity" shipment. You may ship up to 500 milliliters (ml) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 ml.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You must print the hazard class number (8) on the label and sign your name under the hazard class number.

A printed name is not acceptable.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 8 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

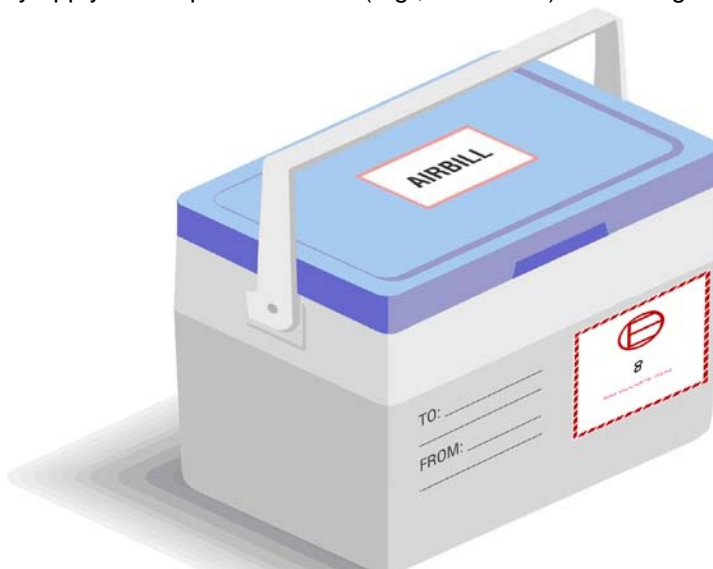
Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.

Instructions for Sulphuric Acid Preservative (< or =51% solution, Excepted Quantity)

Applicability

These instructions only apply to sample containers (e.g., VOA vials) containing sulphuric acid preservative, before the sample is added to the container. If the sample is not a regulated dangerous good, once it is added to the container with the preservative, the resulting mixture is no longer a dangerous good, and does not have to be shipped in accordance with the dangerous goods procedures.



Training

You must successfully complete online Dangerous Goods Shipping Training before conducting shipping activities. Refresher training is required every 2 years. Click [HERE](#) to check training status. Click [HERE](#) to take training.



Glass, earthenware,
or plastic ≤ 30ml



Inner Packaging

Quantity

This is an "Excepted Quantity" shipment. You may ship up to 500 milliliters (ml) in one outer package. The size of each bottle (the inner packaging) must be no larger than 30 ml.

Packing

Each bottle must be securely packed in an intermediate package, such as a small box, another bottle, or a zip-lock bag. The intermediate package must be filled with enough asbestos-free vermiculite to absorb the entire contents of the inner packaging in case of breakage or leakage. The intermediate package must be packed in a sturdy outer package of plastic (a cooler), wood, or fiberboard. The outer package should be at least 9" x 8" x 6". The inner and outer packagings are not required to be UN/DOT specification packagings.

Cushioning Materials

Use enough Styrofoam peanuts, bubble wrap, or asbestos-free vermiculite to fill the box.

Labeling

Place a "Dangerous Goods in Excepted Quantities" label next to the shipper's or recipient's address. You must print the hazard class number (8) on the label and sign your name under the hazard class number. A printed name is not acceptable.



Obtain labels from your local office mailroom or order directly from [Labelmaster](#). You can also click on the following link to print a label on a **color** printer: [Class 8 Excepted Quantity Label](#)

Airbill

An original airbill must be completed and accompany each shipment. Original airbills may be obtained from your local office mailroom, ordered directly from FedEx or completed online.

Click [HERE](#) to complete an airbill online. Check the "Shipper's Declaration Not Required" box on the airbill.

Dangerous Goods Declaration

A Dangerous Goods Declaration is not required.

Recordkeeping

Maintain copies of all shipping documents for at least 2 years in project files AND your local mailroom. Provide the client with a copy if sending from the client's address.



[Click here for attachments](#)

Benzene

Enterprise Standard Operating Procedure HSE-503

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups must comply with when potentially exposed to airborne concentrations or dermal contact with benzene due to site operations.

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control employee workplace exposure to benzene when personal exposures is at or above 0.5 ppm as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the Occupational Safety and Health Administration (OSHA) Benzene standard, 29 CFR 1910.1028. The elements of the CH2M HILL benzene program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of benzene and control measures
- Record keeping requirements

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental or OSHA programs may have more stringent requirements. Contact the appropriate Responsible Health and Safety Manager (RHSM) or Responsible Environmental Manager (REM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by benzene levels at or above 0.5 ppm as an 8-hour time-weighted average or above 5.0 ppm short term

exposure limit (STEL), regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);

- CH2M HILL Employees are exposed to containers and pipelines carrying mixtures greater than 0.1 percent benzene; natural gas processing plants processing gas with greater than 0.1 percent benzene; hazardous waste sites during well installation, groundwater sampling, drilling, underground fuel tank removals or fuel leaks spills, and soil sampling or other soil-disturbing activities; and other operations where benzene comprises greater than 0.1 percent by volume; or
- CH2M HILL provides oversight of subcontractor's operations which creates benzene levels at or above 0.5 ppm as an 8-hour time-weighted average or above 5.0 ppm short term exposure limit (STEL).

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standards of Practice and Standard Operating Procedures that are applicable to this Benzene SOP are as follows:

- [HSE-107, Hazard Communication](#)
- [HSE-113, Medical Monitoring](#)
- [HSE-117, Personal Protective Equipment](#)
- [HSE-119, Recordkeeping and Access to Records](#)
- [HSE-121, Respiratory Protection](#)
- [HSE-207, Exposure Assessment for Airborne Chemical Hazards](#)

3.0 Definitions

3.1 Action Level (AL)

"Action level" (AL) represents the airborne concentration of benzene, without regard to the use of respirators, where certain regulatory requirements come into effect. Specifically, at or above the action level of 0.5 ppm, medical monitoring and employee training is required.

3.2 Permissible Exposure Limit (PEL)

"Permissible exposure limit" (PEL) represents the level of benzene airborne concentration (1 ppm), without regard to the use of respirators, where all remaining regulatory requirements come into effect.

3.3 Short Term Exposure Limit (STEL)

"Short term exposure limit" (STEL) represents the level of benzene airborne concentration (5.0 ppm over a 15-minute period), without regard to the use of respirators, where all remaining regulatory requirements come into effect.

3.4 Exposure Limits

Exposure limits are based on 8-hour time weighted averages and 15 minute averages for "peak" exposures. If employees are exposed to benzene for more than 8 hours in any work day, the employees' allowable exposure must be less than the PEL for any given 8-hour period during the extended work shift.

OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH) have established occupational exposure limits for benzene. Each is identified in Table 1 below.

Table 1

Established Exposure Limits

Agency	Action level	PEL	OEL	STEL
OSHA	0.5 ppm	1 ppm	N/A	5.0 ppm/15 minutes
ACGIH	N/A	N/A	0.5 ppm	2.5 ppm/15 minutes

3.5 Threshold Limit Values (TLV)

The ACGIH has established an occupational exposure limit (OEL) of 0.5 ppm as 8-hour time weighted average and 2.5 ppm as a 15-minute short term exposure limit [NOTE: In some cases, the ACGIH limits for airborne concentrations of contaminants are below the OSHA PEL. In such instances, CH2M HILL shall determine the feasibility of using the lower limit(s).]

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Project Manager (PM)

The PM will provide the RHSM and SC, with project-specific information to determine what tasks or operations may potentially generate airborne benzene. The PM will ensure the elements of this SOP are implemented including determining personal exposure monitoring, medical surveillance, training, and appropriate PPE, including respiratory protection, is acquired, worn and maintained by project employees.

4.2 Responsible Health and Safety Manager (RHSM)

The responsible Health and Safety Manager (RHSM) determines project benzene monitoring requirements, provides control recommendations and assistance, selects appropriate PPE and respiratory protection, provides technical assistance to the SC for implementing the site-specific benzene program, and conducts project Health and Safety (HS) audits on the effectiveness of the project's written safety plan.

4.3 Safety Coordinator (SC)

The SC, with the technical support from the RHSM, assesses the project site for benzene exposure, maintains exposure records in the project files when required, notifies employees of monitoring results, verifies PPE and respiratory protection is provided and worn, ensures

project employees have completed training and medical surveillance as required, and requests input from project staff that the assigned PPE and respiratory protection meets ongoing requirements and effectiveness.

5.0 Requirements

The following requirements, outlined in this Enterprise SOP, must be implemented when employees are exposed to airborne benzene concentrations at or above PEL or STEL, without regard to respirator use.

5.1 Safe Work Practices

The following safe work practices are to be followed by CH2M HILL regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

5.1.1 Compliance Program

- When exposures are greater than the PEL, a written compliance program shall be established and implemented prior to commencement of operations within the scope of this SOP.
- The written program shall outline the plans for maintaining employee exposure below the PEL. Attachment 1: Subcontractor Safety Procedures Criteria- Benzene provides the requirements for written compliance program content.
- The compliance program shall be based on the most recent exposure monitoring data. The program shall be revised when exposure monitoring data is updated to reflect the status of the program.
- The written compliance program shall be made available to all affected employees.
- Employees must be informed on where benzene is used on a client facility as part of the project site orientation including a briefing on the site emergency plan and the client's contingency plans and provisions.
- Benzene liquid is highly flammable and vapors may form explosive mixtures in air. The appropriate class and size of fire extinguishers must be readily available in the area where benzene is used or stored.
- Waste containing significant amounts of benzene may be subject to hazardous waste regulations and the corresponding generation, treatment and disposal requirements. Refer to the [Waste Management Planning SOP HSE-413](#) for information on how to determine whether the waste is considered hazardous waste.

5.1.2 Employee Information

- A Benzene Fact Sheet in Attachment 3 provides basic awareness level information on benzene. This information is not intended to replace or fulfill the requirements for maintaining benzene material safety data sheets (MSDS).

- Respiratory protection selection shall be based on the most relevant exposure monitoring results.
- In addition to the posting requirements, written or verbal notification to owners, contractors, and other personnel working in the area shall be made.
- All storage containers shall be labeled with the following “Danger-Contains Benzene -Cancer Hazard”.

5.1.3 Regulated Areas

- Regulated areas are those where airborne concentrations of benzene are above the permissible exposure limit (PEL) or the short term exposure limit (STEL), without regard to the use of respirators. Personnel shall not enter regulated areas unless training, medical monitoring, and PPE, including respirator protection, requirements have been met.
- Regulated areas shall be demarcated and entry to these areas shall be limited. Only authorized personnel are allowed in these areas.
- The entrance to regulated areas shall be posted with signs that read “DANGER-CONTAINS BENZENE-CANCER HAZARD-FLAMMABLE-NO SMOKING-AUTHORIZED PERSONNEL ONLY-RESPIRATOR REQUIRED” so that necessary protective steps can be taken before entering regulated areas.

5.2 Exposure Assessment

- Initial exposure monitoring is conducted to document employees’ breathing-zone exposures over the course of a full shift. Representative 8-hour TWA and 15-minute STEL samples shall be collected for each job classification in each work area.
- Personal monitoring of employees is required at least every year when the initial monitoring indicates TWA results are equal to or greater than the Action Level (AL) but less than the PEL.
- When initial monitoring results are greater than the PEL, additional monitoring, at least every 6 months, for each employee involved is required.
- Monitoring for the STEL will be repeated at a frequency determined by the RHSM.
- When initial monitoring results are below the AL, monitoring may be suspended.
- Personnel monitoring may be halted when two consecutive samples taken 7 days apart are below AL.
- Additional monitoring is required when there has been a change in production process, control equipment, personnel, or work practices that may result in new or additional exposures.
- Employees shall be informed in writing of exposure monitoring results within 15 working days after receipt of the results.

- In cases when the PEL has been exceeded, the notification to the affected employee shall include the control measures utilized to reduce the exposure to below the PEL.
- After the cleanup of spills, leaks, ruptures, or other breakdowns area, personal sampling is required to ensure employee exposures have returned to levels which existed prior to the incident.

5.3 Control Methods

Table 2 lists industrial operations where exposure to benzene may occur and control methods that may be effective in each case.

TABLE 2:
Common Benzene Operations and Controls

Operation	Controls
During manufacture and processing of benzene; use as a raw material in the production of aromatic compounds and derivatives	Process enclosure, local exhaust ventilation, Personal protective equipment (PPE)
During the use of chemicals in which benzene may be an impurity (for example, naphtha, toluene, xylene)	Process enclosure, local exhaust ventilation, PPE
During the manufacture and use of motor fuel blends in which benzene is used as an ingredient; during use as an extracting solvent	Process enclosure, local exhaust ventilation, PPE, material substitution
During the preparation and use of paint and varnish removers, rubber cements, and lacquers	Process enclosure, local exhaust ventilation, PPE, material substitution

5.3.1 Engineering and Work Practice Controls

- Engineering and work practice controls, including administrative controls, shall be implemented to reduce and maintain employee exposure to benzene at or below the PELs (TWA and STEL) to the extent that such controls are feasible.
- Where all feasible engineering and work practice controls that can be instituted are not sufficient to reduce employee exposure to or below the PELs, such controls shall be used nonetheless to reduce employee exposure to the lowest feasible level and in conjunction with respiratory protection as described in Section 5.3.2.
- When benzene exposures are less than 30 days per year, exposures can be controlled through the use of engineering controls, work practices, and respiratory protection to reduce exposures to or below the PEL, except that only engineering and work practice controls must be used to reduce exposure to below 10 ppm as an 8-hour TWA.

5.3.2 Respiratory Protection

- Respiratory protection must be used during periods when employee exposure to benzene exceeds the PELs (TWA or STEL), during work operations for which engineering or work practice controls are not sufficient to reduce employee exposure to

or below the PEL, during periods when an employee requests a respirator, and when respirators are required to provide interim protection during initial exposure assessments.

- A respiratory protection program, including respirator selection, shall be implemented in accordance with OSHA 29 CFR 1910.134 and with CH2M HILL SOP [HSE-121, Respiratory Protection](#). Subcontractor respiratory protection programs shall meet or exceed these requirements.
- When air purifying respirators are utilized, the cartridges shall be replaced based on a cartridge change-out schedule developed by the RHSM or at the beginning of each shift, whichever comes first.

Personal Protective Equipment (PPE)

- Employees shall be provided, at no cost, protective work clothing and equipment to protect employees against eye contact and dermal contact to liquid benzene.

5.3 Medical Surveillance

CH2M HILL shall institute medical surveillance for any employees who are or will be exposed to airborne benzene:

- At or above the action level, without regard to respirator use, for at least 30 days per year,
- At or above the permissible exposure levels (PELs) for 10 or more days per year, or
- More than 10 ppm for 30 or more days in a prior year while employed by CH2M HILL.

Further information and details of the CH2M HILL medical surveillance program are provided in SOP HSE-113, Medical Monitoring and SOP HSE-119, Recordkeeping and Access to Records.

Subcontractors are responsible for their employees receiving medical surveillance as required.

5.4 Records

Benzene exposure monitoring and medical surveillance records shall be maintained according to SOP HSE -119, Recordkeeping and Access to Records. Employees shall be provided access to benzene exposure and medical surveillance records upon request, according to SOP HSE-119, Recordkeeping and Access to Records.

5.5 Subcontractor HSE Oversight

Where subcontractor equipment operations generate airborne benzene concentrations at or above the action level without regard to respirator, the subcontractor is responsible for reducing and maintaining the benzene exposure to their employees below 0.5 ppm. The subcontractor is responsible for implementing suitable controls, including engineering, administrative, and PPE.

The “Subcontractor Safety Procedure Criteria – Benzene” listed in Attachment 1 provides the minimum criteria, and may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor’s operations.

6.0 Training Requirements

CH2M HILL employees who anticipate working on projects where they could be exposed to airborne benzene above the action limit without regard to respirator use, must complete the on-line “Benzene Exposure” training module located on the HSSE web page of the virtual office project-specific benzene-exposure-control training. The on-line training involves viewing computer based program and completing a quiz. On-line training objectives consist of:

- Where benzene is typically encountered at CH2M HILL projects,
- Regulatory requirements, exposure limits,
- Potential hazards including toxicity and physical characteristics, and
- Medical monitoring requirements.

Project-specific benzene -exposure-control training shall include the following:

- Discussion of site-specific benzene hazards and associated control measures,
- Information contained in the Benzene Fact Sheet (Attachment 3) and the site specific Health, Safety, and Environmental Protection Plan or Field Safety Instruction created for the project,
- Quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations that could result in exposure to benzene, as well as any necessary protective steps,
- Purpose, proper use, and limitation of respirators,
- Purpose and a description of the medical surveillance program,
- Engineering controls and work practices associated with the employee's job assignment, and
- A review of this standard by providing with a copy of the OSHA Benzene Standard and appendices if requested by an employee.

Both the on-line and project specific training programs shall be repeated each year an employee is exposed at or above the action level.

7.0 Checklists

The “HSE Self-Assessment Checklist – Benzene in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SC and provides this information in the project’s written safety plan. The RHSM shall assist the SC in resolving any deficiencies identified during the

self-assessment. The RHSM may also use this checklist when performing HS audits at CH2M HILL projects, including subcontractor's activities.

8.0 References

The following regulations were referenced to prepare this Enterprise Standard Operating Procedure:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1028, Benzene


9.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria – Benzene](#)

Attachment 2 [Benzene HSE Self Assessment Checklist](#)

Attachment 3 [Benzene Fact Sheet](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By:
1.0	08/21/2007	Updated to Standard Operating Procedure	Jeff Stumpf	



Attachment 1: Subcontractor Safety Procedure Criteria - Benzene

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor benzene procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Benzene Operation Procedures:

1. Provide the name and qualifications of the “competent person” responsible for benzene operations (years of experience, training, certification, etc.).
2. Provide the training records for personnel involved in operations where there is a potential or known exposure to benzene above the action level.
3. Provide medical surveillance approvals for individuals exposed to benzene above the permissible exposure limit. Also, provide medical approval for individuals required to wear respirators.
4. Provide information pertaining to the development of an exposure assessment. The information should include the basis of sampling for compliance with the benzene standard.
5. Provide a copy of the written respiratory protection program when respirators are anticipated to be used to control exposure to benzene.
6. Describe work activities and locations where benzene is present or will be introduced into the project work environment.
7. Describe substances which have been considered as substitutes or alternatives to the introduction of benzene into the project work environment.
8. Provide background information when a negative exposure assessment will be utilized to assess benzene exposure.
9. Describe control methods to be utilized to minimize exposure to benzene.
10. Provide a copy of the written program to reduce employee exposure to or below the PEL, including a schedule of development and implementation of the engineering and work practice controls. If it is not expected that the PEL for benzene will be exceeded during subcontractor operations, a plan is not required. However, if the PEL is exceeded and a regulated area must be established, then the subcontractor must stop work until this written program has been developed and reviewed by the RHSM.
11. Describe methods used to dispose of benzene-containing waste.



Attachment 2: HSE Self-Assessment Checklist



HSE Self-Assessment Checklist—Benzene

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to benzene, or are required to perform oversight of a subcontractor whose personnel are exposed to benzene.

CH2M HILL staff shall not direct the means and methods of subcontractor benzene activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL compliance with its Benzene program (SOP HSE-503)
- ☐ Evaluate a CH2M HILL subcontractor's compliance with its Benzene program

Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1

PERSONNEL SAFE WORK PRACTICES (5.1) COMPLIANCE PROGRAM (5.1.1)

Yes No N/A N/O

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. A written compliance program is established for work above the PEL. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The compliance program includes a schedule for development and implementation of the engineering and work practice controls. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The compliance program is based on the most recent air monitoring results. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The compliance program is available to all affected employees. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 2		Yes	No	N/A	N/O
EMPLOYEE INFORMATION (5.1.2)					
5.	CH2M HILL personnel have completed the Benzene Training Module	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	The selection of the appropriate respirator is based on the airborne benzene concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Written or verbal notification to owners, contractors or other personnel working in the area of benzene work activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Storage or shipping containers have been properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
REGULATED AREAS (5.1.3)					
10.	Areas that exceed the PELs (TWA or STEL) have been designated as regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Personnel meet medical and training requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Warning signs have been posted at all entrances to the regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXPOSURE ASSESSMENTS (5.2)					
13.	Initial air monitoring (TWA & STEL) conducted over full shift for each job classification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Air sampling conducted at least yearly when exposure limit (EL) ≥ AL but < PEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Air sampling of employees conducted every six months when EL ≥ PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Additional air monitoring has been collected when there are any changes in operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Employees have been informed of air monitoring results within 15 days after receipt of results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Where PELs is exceeded, affected employees have been notified of results and control measures to be utilized to reduce exposure below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Personal sampling conducted after spills, leaks, ruptures, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL METHODS (5.3)					
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)					
20.	Engineering controls and work practices have been utilized to reduce exposures below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	When controls are unable to reduce exposures below the PEL, respiratory protection is utilized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Regulated areas have been established where exposures exceed the PEL or STEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATORY PROTECTION (5.3.2)					
22.	Respirators are used in areas where EL ≥ PELs (TWA or STEL).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	Respirator cartridges are replaced based on change-out schedule.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERSONAL PROTECTIVE EQUIPMENT (5.3.3)					
24.	PPE is supplied by the employer to the employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	PPE is selected to protect against eye and dermal contact.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]

HSE-503 VERSION 1 – A2



Attachment 3: Benzene Fact Sheet

Uses and Occurrences: Found in gasoline and other fuels, and used in the manufacture of plastics, detergents, pesticides, and other chemicals.

Physical Characteristics:

Appearance:	Clear, colorless liquid
Odor:	Sweet, aromatic odor
Flammable:	Class IB; NFPA Rating: 3
Flash Point:	11°C (52°F)
Flammable Range:	1.3% to 7.5%
Specific gravity:	0.879; (water = 1.0)
Stability:	Stable
Incompatibilities:	Heat and Oxidizing Agents
Melting Point:	5.5°C (42°F)
Boiling Point:	80.1°C (176 °F)

Signs and Symptoms of Exposure:

Inhalation:	<u>Short term</u> : headaches, nausea, dizziness, respiratory irritation, convulsions, and respiratory paralysis. <u>Long term</u> : fatigue, nervousness, irritability, blurred vision, and bone marrow depression (leukemia)
Skin and Eye:	<u>Short term</u> : dermatitis, irritation. <u>Long term</u> : redness, blistering, and dry, scaly dermatitis
Ingestion:	Gastrointestinal irritation

Modes of Exposure:

Inhalation:	Vapors
Absorption:	Liquid
Ingestion:	Liquid

Exposure Limits:

Action level (AL):	0.5 ppm
PEL:	1 ppm
STEL:	5 ppm
PEL-C:	None
TLV:	0.5 ppm

TLV-STEL

2.5 ppm

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Benzene standard and Training
EL > PEL	Implement all portions of the OSHA Benzene Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety Glasses; contact lenses should **not** be worn

Skin: Chemical protective clothing and gloves

Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air; contact a physician

Skin: Quick drenching of body; wash with soap and water

Eyes: Flush with water for 15 minutes, lifting lower and upper lids occasionally; seek medical attention immediately

Ingestion: DO NOT INDUCE VOMITING; seek medical attention immediately



Cadmium

Enterprise Standard Operating Procedure HSE-504

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must comply with when potentially exposed to airborne concentrations with cadmium caused by site operations.

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control employee workplace exposure to cadmium when personal exposure is at or above 2.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) by implementing a program that meets the requirements of the Occupational Safety and Health Administration (OSHA) Cadmium standard, 29 *Code of Federal Regulations* (CFR) 1926.1127. The elements of the CH2M HILL cadmium program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of cadmium and control measures
- Recordkeeping requirements

2.2 Application

This SOP applies Enterprise-wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors, and their lower-tier subcontractors that operate in the United States (U.S.) and internationally.

Some state environmental and OSHA programs may have more stringent requirements. Contact the appropriate Responsible BG Health and Safety Manager (HSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety, and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL employees are exposed to the hazards posed by cadmium airborne concentration at or above $2.5 \mu\text{g}/\text{m}^3$ of cadmium, regardless of the company

responsible for the operations (CH2M HILL, subcontractor, or third-party contractor).

- CH2M HILL provides oversight of subcontractor's operations, which creates cadmium airborne concentration at or above 2.5 µg/m³ of cadmium.

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standards of Practice and Standard Operating Procedures applicable to this Cadmium SOP are as follows:

- [HSE-107, Hazard Communication](#)
- [HSE-113, Medical Monitoring](#)
- [HSE-117, Personal Protective Equipment](#)
- [HSE-119, Recordkeeping and Access to Records](#)
- [HSE-127, Respiratory Protection](#)
- [HSE-207, Exposure Assessment for Airborne Chemical Hazards](#)

3.0 Definitions

3.1 Action Level (AL)

"Action level" (AL) represents the airborne concentration of cadmium, without regard to the use of respirators, in which certain regulatory requirements come into effect. Specifically, at or above the action level of 2.5 µg/m³ of cadmium, medical monitoring, and employee training is required.

3.2 Permissible Exposure Limit (PEL)

"Permissible exposure limit" (PEL) represents the level of cadmium airborne concentration (5.0 µg/m³), without regard to the use of respirators, in which all remaining regulatory requirements come into effect.

3.3 Exposure Limits

Exposure limits are based on 8-hour, time-weighted averages (TWAs). If an employee is exposed to cadmium for more than 8 hours in any workday, the employee's allowable exposure must be less than the PEL for any given 8-hour period during the extended work shift.

OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH) have established occupational exposure limits for cadmium. Each is identified in Table 1.

TABLE 1
Established Exposure Limits

Agency	Action Level	PEL	TLV®
OSHA	2.5 µg/m ³	5 µg/m ³	N/A
ACGIH	NA	NA	10 µg/m ³ (A2) 2 µg/m ³ respirable

3.4 Threshold Limit Value (TLV)

The ACGIH has established a threshold limit value (TLV) of 5 µg/m³ and 2 µg/m³ respirable fraction [NOTE: In some cases, the ACGIH limits for airborne concentrations of contaminants are below the OSHA PEL. In such instances, CH2M HILL shall determine the feasibility of using the lower limit(s).] ACGIH also classifies cadmium as a Suspected Human Carcinogen (A2).

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Project Manager (PM)

The PM will provide the Responsible Health and Safety Manager (RHSM) and Safety Coordinator (SC), with project-specific information to determine what tasks or operations may potentially generate airborne cadmium. The PM will ensure the elements of this SOP are implemented including determining personal exposure monitoring, medical surveillance, training, and appropriate PPE, including respiratory protection, is acquired, worn and maintained by project employees.

4.2 Responsible Health and Safety Manager

The RHSM determines project cadmium monitoring requirements, provides control recommendations and assistance, selects appropriate PPE and respiratory protection, provides technical assistance to the SC for implementing the site-specific cadmium program, and conducts project Health and Safety (H&S) audits on the effectiveness of the project's written safety plan.

4.3 Safety Coordinator

The SC, with the technical support from the RHSM, assesses the project site for cadmium exposure, maintains exposure records in the project files when required, notifies employees of monitoring results, verifies PPE and respiratory protection is provided and worn, ensures project employees have completed training and medical surveillance (as required), and requests input from project staff that the assigned PPE and respiratory protection meet ongoing requirements and effectiveness. The SC will serve as the Cadmium Competent Person for the project site.

4.4 Cadmium Competent Person

The Cadmium Competent Person is required to identify existing and potential cadmium hazards in the work environment, and take prompt corrective action to eliminate or control such hazards. The designated "competent person" must be, at a minimum, able to perform the following:

- Determine, before beginning a job, if cadmium is present in the workplace.

- Establish regulated areas and ensure that access to and from those areas is limited to authorized employees.
- Ensure the adequacy of any employee exposure monitoring required by this SOP.
- Ensure that all employees exposed to airborne cadmium levels above the PEL wear the appropriate PPE and are trained to use appropriate methods to control cadmium exposure.
- Ensure that proper hygiene facilities are provided and workers are trained to use these facilities.
- Ensure that required engineering controls are implemented, maintained in proper operating condition, and functioning properly.

5.0 Requirements

The following requirements, outlined in this Enterprise SOP, must be implemented when employees are exposed to airborne cadmium concentrations at or above PEL without regard to respirator use.

5.1 Safe Work Practices

The following safe work practices are to be followed by CH2M HILL, regardless of the company responsible for the operation (CH2M HILL, subcontractor, or third-party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

5.1.1 Compliance Program

- When exposures are greater than the PEL, a written compliance program shall be established and implemented before commencement of operations within the scope of this SOP.
- The written program shall outline the plans for maintaining employee exposure below the PEL. Attachment 1: Subcontractor Safety Procedures Criteria-Cadmium provides the requirements for written compliance program content.
- The compliance program shall be based on the most recent exposure monitoring data. The program shall be revised when exposure monitoring data is updated to reflect the status of the program.
- The written compliance program shall be made available to all affected employees.
- A written plan for dealing with emergency situations involving substantial releases of airborne cadmium shall be developed.
- Waste containing significant amounts of cadmium may be subject to hazardous waste regulations and the corresponding generation, treatment, and disposal requirements. Refer to the SOP [HSE-413, Waste Management Planning](#), for information on how to determine if the waste is considered hazardous waste.

5.1.2 Employee Information

- The Cadmium Fact Sheet in Attachment 3 provides basic awareness level information on cadmium. This information is not intended to replace or fulfill the requirements for maintaining cadmium material safety data sheets (MSDSs).
- Respiratory protection selection shall be based on the most relevant exposure monitoring results.
- Contact lenses should not be worn when working with cadmium.
- In addition to the posting requirements, written or verbal notification to owners, contractors, and other personnel working in the area shall be made.
- All storage or shipping containers shall be labeled with the following:
"DANGER-CONTAINS CADMIUM-CANCER HAZARD-AVOID CREATING
DUST-CAN CAUSE LUNG AND KIDNEY DISEASE."

5.1.3 Regulated Areas

- Regulated areas are those where airborne concentrations of cadmium are above the PEL without regard to the use of respirators. Personnel shall not enter regulated areas unless training, medical monitoring, and PPE, including respirator protection, requirements have been met.
- Regulated areas shall be demarcated and entry to these areas shall be limited. Only authorized personnel are allowed in these areas.
- The entrance to regulated areas shall be posted with signs that read:
"DANGER-CADMIUM-CANCER HAZARD-CAN CAUSE LUNG AND KIDNEY
DISEASE-AUTHORIZED PERSONNEL ONLY-RESPIRATORS REQUIRED IN THIS
AREA" so that necessary protective steps can be taken before entering regulated areas.
- Where feasible, shower facilities shall be installed and employees who work in regulated areas shall be required to shower at the end of the work shift. These facilities must be provided with an adequate supply of cleaning agents and towels.
- Hand-washing facilities shall be provided for employees working in regulated areas. Furthermore, employees shall be required to wash their hands and face at the end of each work shift and before eating or entering eating facilities, drinking, smoking, or applying cosmetics.
- Employees shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in any areas where exposure to cadmium is above the PEL (that is, regulated areas).
- Eating facilities or areas shall be provided for employees working in regulated areas. These facilities shall be maintained free of cadmium contamination and readily accessible to employees.
- Change areas, equipped with separate storage facilities for protective work clothing and equipment and for street clothing that prevents cross-contamination, shall be provided for all employees working in regulated areas or areas where there is the possibility of skin or eye irritation from cadmium.

5.1.4 Housekeeping

- All surfaces shall be maintained as free as possible of accumulations of cadmium. Methods selected for cleaning surfaces and floors shall be those that minimize the likelihood of cadmium becoming airborne (for example, vacuuming).
- Where vacuuming methods are selected, high-efficiency particulate air (HEPA)-filtered vacuums shall be used and emptied in a manner that minimizes the re-entry of cadmium into the workplace.
- Compressed air shall not be used to remove cadmium from any surface, unless used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

5.2 Exposure Assessment

- Initial exposure monitoring is conducted to document employees' breathing-zone exposures over the course of a full shift. A representative 8-hour TWA sample shall be collected for each job classification in each work area.
- Where objective data is available that demonstrates that employee exposures to cadmium will not exceed airborne concentrations at or above the AL under expected site conditions, initial monitoring is not required.
- Additional monitoring is required during periodic tasks performed that may expose an employee to a higher concentration of airborne cadmium than the representative sampling conducted during the initial monitoring.
- Personal monitoring of employees is required at least every 6 months when the initial monitoring indicates TWA results are equal to or greater than the AL but less than the PEL.
- Additional monitoring, at least quarterly, for each employee involved is required when initial monitoring results are greater than the PEL.
- Monitoring may be suspended when initial monitoring results are below the AL.
- Personnel monitoring (semiannually or quarterly) may be halted when two consecutive samples taken 7 days apart are below the AL.
- Additional monitoring is required when there has been a change in production process, control equipment, personnel, or work practices that may result in new or additional exposures.
- Employees shall be informed in writing of exposure monitoring results within 5 working days after receipt of the results.
- In cases in which the PEL has been exceeded, the notification to the affected employee shall include the control measures used to reduce the exposure to below the PEL.

5.3 Control Methods

Table 2 lists industrial operations in which exposure to cadmium may occur and control methods that may be effective in each case.

TABLE 2
Common Cadmium Operations and Controls

Operation	Controls
Fabrication of cadmium-plated marine, aircraft, and motor vehicle equipment for corrosion-resistant coatings.	Local exhaust ventilation; PPE.
Casting of alloys for cadmium-containing products used for coating telephone cables, welding electrodes, circuit breakers, low-temperature solder, aircraft relays, fire alarms, and high-pressure/ temperature bearings.	Process enclosure, local exhaust ventilation; PPE.
Castings and use of solder; melting of cadmium ingots for paint and pigment manufacture used for coloring of plastics and ceramic glazes, electroplating, and in chemical synthesis.	Process enclosure; local exhaust ventilation; PPE.
Manufacture of nickel-cadmium batteries for use in radio-portable telephones, convenience appliances, and vented cells used in airplanes, helicopters, and standby power and lighting.	Process enclosure; local exhaust ventilation; PPE.
Manufacture of nuclear reactor rods.	Process enclosure; local exhaust ventilation.

5.3.1 Engineering and Work Practice Controls

- Engineering and work practice controls, including administrative controls, shall be implemented to reduce and maintain employee exposure to cadmium, at or below the PEL, to the extent that such controls are feasible.
- Where all feasible engineering and work practice controls that can be instituted are not sufficient to reduce employee exposure cadmium, to or below the PEL, such controls shall be used nonetheless to reduce employee exposure to the lowest feasible level and in conjunction with respiratory protection as described in Section 5.3.2.
- The rotation of employees shall not be used as a control method.
- Where mechanical ventilation is used to control exposure, an evaluation of the mechanical performance of the system in controlling exposure shall be conducted, as necessary, to maintain the system's effectiveness. When air is recirculated back into the workplace, the system shall have a HEPA filter installed.
- The use of high-speed abrasive disc saws or abrasive power equipment shall not be allowed on cadmium or cadmium-coated surfaces, unless engineering controls, such as a HEPA vacuum system is attached, which will control emissions.
- Materials containing cadmium shall not be applied by spray methods, unless appropriate PPE is provided, measures are taken to limit overspray, adjacent areas are protected from contamination, and other controls to limit airborne concentrations.

5.3.2 Respiratory Protection

- Respiratory protection must be used during the following:
 - Periods when employee exposure to cadmium exceeds the PEL
 - Work operations for which engineering and work-practice controls are not sufficient to reduce employee exposure to or below the PEL
 - Periods when an employee requests a respirator; and periods when respirators are required to provide interim protection during initial exposure assessments
- A respiratory protection program, including respirator selection, shall be implemented in accordance with OSHA 29 CFR 1910.134 and with CH2M HILL SOP HSE-121, Respiratory Protection. Subcontractor respiratory protection programs shall meet or exceed these requirements.
- When air-purifying respirators are used, the HEPA filters shall be replaced at the beginning of each shift.
- Powered air-purifying respirators (PAPR) shall be provided to employees who request such a respirator and when it will provide adequate protection.

5.3.3 Personal Protective Equipment (PPE)

- Employees shall be provided, at no cost, protective work clothing and equipment, including coveralls or similar full-body clothing, gloves, foot coverings, face shields, or vented goggles when working in regulated areas or when there is a possibility of skin or eye irritation from cadmium.
- Protective clothing shall be provided in a clean and dry condition at least weekly.
- All protective clothing shall be cleaned, laundered, or disposed of by the employer.
- Protective clothing found to be ineffective shall be repaired or replaced by the employer.
- All contaminated clothing found in change rooms shall be removed at the end of each work shift.
- Employees shall not be allowed to leave the workplace wearing any protective clothing or equipment required during the work shift.
- All clothing requiring laundering will be packaged in a sealed container. Containers shall be labeled in accordance with the labeling requirements stated in Section 5.1.2 of this SOP.
- Any person who cleans or launders protective clothing or equipment shall be informed in writing of the potentially harmful effects of exposure to cadmium.

5.4 Medical Surveillance

CH2M HILL shall institute medical surveillance for any employees who are or will be exposed to airborne cadmium above the AL, without regard to respirator use, for at least 30 days per year.

For CH2M HILL employees who have been exposed above the AL without regard to respirator use for 30 days or more per year for a total of 10 years or more of combined employment with CH2M HILL, or predecessor employers, inclusion in the medical surveillance program is required.

Further information and details of the CH2M HILL medical surveillance program are provided in SOP HSE-113: Medical Monitoring and SOP HSE-119: Recordkeeping and Access to Records.

Subcontractors are responsible for their employees receiving medical surveillance as required.

5.5 Records

Cadmium exposure monitoring records and medical surveillance records shall be maintained according to SOP HSE-119, Recordkeeping and Access to Records, and employees shall be provided access to cadmium exposure and medical surveillance records upon request.

5.6 Subcontractor HSE Oversight

Where subcontractor equipment operations generate airborne cadmium concentrations at or above the AL without regard to respirator use, the subcontractor is responsible for reducing and maintaining the cadmium exposure to their employees below 2.5 µg/m³. The subcontractor is responsible for implementing suitable controls, including engineering, administrative, and PPE.

The Subcontractor Safety Procedure Criteria – Cadmium, listed in Attachment 1, provides the minimum criteria and may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor's operations.

6.0 Training Requirements

CH2M HILL employees who anticipate working on projects where they could be exposed to airborne cadmium above the AL without regard to respirator use must complete the online "Cadmium" training module located on the HSE Web page of the virtual office project-specific cadmium-exposure-control training. The online training involves viewing a computer-based program and completing a quiz. Online training objectives consist of the following:

- CH2M HILL projects where cadmium is typically encountered
- Regulatory requirements, exposure limits
- Potential hazards including toxicity and physical characteristics
- Medical monitoring requirements

Project-specific cadmium-exposure-control training shall include the following:

- Discussion of site-specific cadmium hazards and associated control measures

- Information contained in the Cadmium Fact Sheet (Attachment 3) and the site-specific Health, Safety, and Environmental Protection Plan or Field Safety Instruction created for the project
- Quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations that could result in exposure to cadmium, as well as any necessary protective steps
- Purpose, proper use, and limitation of respirators
- Purpose and a description of the medical surveillance program
- Engineering controls and work practices associated with the employee's job assignment
- Review of this standard by providing with a copy of the OSHA Cadmium Standard and appendices, if requested by an employee

Both the online and project-specific training programs shall be repeated each year an employee is exposed at or above the AL.

7.0 Checklists

The HSE Self-Assessment Checklist – Cadmium in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SC and provides this information in the project's written safety plan. The RHSM shall assist the SC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor's activities.

8.0 References

The following regulations were referenced to prepare this Enterprise Standard Operating Procedure:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1027, Cadmium.
- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1926.1127, Cadmium.


9.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria – Cadmium](#)

Attachment 2 [Cadmium HSE Self Assessment Checklist](#)

Attachment 3 [Cadmium Fact Sheet](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By:
1.0	08/21/2007	Updated to Standard Operating Procedure	Jeff Stumpf	



Attachment 1: Subcontractor Safety Procedure Criteria

The following criteria are not intended to be all-inclusive but are provided as a tool to facilitate development and review of subcontractor cadmium procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Cadmium Operation Procedures

1. Provide the name and qualifications of the “competent person” responsible for cadmium operations (for example, years of experience, training, certification, etc.).
2. Provide the training records for personnel involved in operations in which there is a potential or known exposure to cadmium above the AL.
3. Provide medical surveillance approvals for individuals exposed to cadmium above the permissible exposure limit. Also, provide medical approval for individuals required to wear negative pressure respirators.
4. Provide information pertaining to the development of an exposure assessment. The information should include the basis of sampling for compliance with the Cadmium Standard.
5. Provide background information when a negative exposure assessment is used.
6. Describe control methods to be used to minimize exposure to cadmium.
7. Provide a written compliance program addressing the following topics:
 - A description of each activity in which cadmium is emitted
 - A description of the specific means that will be employed to achieve compliance, such as engineering plans
 - A report of the technology considered in meeting the PEL
 - Air-monitoring data that documents the source of cadmium emissions
 - A detailed schedule of implementation of the program, such as purchase order and construction contracts
 - A work practice program
 - An administrative control schedule
 - A description of arrangements to share information among contractors onsite pertaining to exposures to cadmium
 - Any other relevant information
8. Provide a copy of a written emergency plan dealing with accidental releases of cadmium.
9. Provide a copy of a written respiratory protection program, if it is anticipated that respirators will be used, in conjunction with engineering and work practice controls to maintain employee exposure to cadmium below the PEL.
10. Describe methods used to recycle or dispose cadmium-containing waste. A Waste Subcontractor Qualification Form must be completed.



Attachment 2: HSE Self-Assessment Checklist



HSE Self-Assessment Checklist—Cadmium

Page 1 of 4

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's Health and Safety Plan/Federal Safety Instructions (HSP/FSI). This checklist is to be used at locations where CH2M HILL employees are exposed to cadmium or are required to perform oversight of a subcontractor whose personnel are exposed to cadmium.

CH2M HILL staff shall not direct the means and methods of subcontractor cadmium activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (such as, a possibility of serious injury or death) must be corrected immediately, or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____
Location: _____ Project Manager: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed for the following:

- ☐ Evaluate CH2M HILL compliance with its Cadmium Program (SOP HSE-504)
☐ Evaluate a CH2M HILL subcontractor's compliance with its Cadmium Program
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1

PERSONNEL SAFE WORK PRACTICES (5.1) COMPLIANCE PROGRAM (5.1.1)

1. Where $EL \geq PEL$, a written compliance program is implemented before commencing work
2. The compliance program is based on the most recent air-monitoring/sampling results.
3. The compliance program is updated for new exposure monitoring data.
4. A written compliance program is available to all affected employees.
5. Waste generated must be determined whether considered hazardous waste or not.

Yes No N/A N/O

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EMPLOYEE INFORMATION (5.1.2)

6. CH2M HILL personnel have completed the Cadmium Training Module.
7. Training on the Fact Sheet, HSP/FSI, and OSHA standard has been met.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Yes	No	N/A	N/O
8. The selection of the appropriate respirator is based on the airborne cadmium concentration.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Personnel working near cadmium-contaminated soil or material shall use wet methods and work practices to control dust; wear disposable coveralls, and exercise personal hygiene practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Contact lenses are not worn when working with cadmium.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Written or verbal notification to owners, contractors, or other personnel working in the area of cadmium work activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Storage or shipping containers have been properly labeled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
REGULATED AREAS (5.1.3)				
13. Areas that exceed the PEL have been designated as regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Personnel meet medical and training requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Warning signs have been posted at all entrances to the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Shower facilities are installed and used with cleaning agents and towels, where feasible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Hand-washing facilities are provided for use by employees before eating, drinking, smoking, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. No eating, drinking, and/or smoking are allowed in the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Eating facilities provided for employees working in regulated areas are free of cadmium.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Change areas are provided where $EL \geq PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOUSEKEEPING (5.1.4)				
21. All surfaces are free of any accumulation of cadmium.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Cleaning methods minimize airborne cadmium activity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Where vacuuming is used, HEPA vacuums are used and emptied to minimize airborne cadmium.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. A written housekeeping and maintenance plan is in place.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Compressed air not used to remove cadmium from surfaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXPOSURE ASSESSMENTS (5.2)				
26. Initial air monitoring is conducted over full shift for each job classification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Where historical data is used in the assessment, data was collected within the past 12 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Air sampling is conducted every 6 months when exposure limit (EL) $\geq AL$ but $< PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Air sampling of employees is conducted quarterly when $EL \geq PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Additional air monitoring has been collected when there are any changes in operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Employees have been informed of air-monitoring results within 5 days after receipt of results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Where PEL is exceeded, affected employees have been notified of results and control measures to be used to reduce exposure below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL METHODS (5.3)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)				
33. Engineering controls and work practices have been used to reduce exposures below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. When controls are unable to reduce exposures below the PEL, respiratory protection is used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Employee rotation is not used to control exposures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Mechanical ventilation used to control exposure must be maintain in an effective operating condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESPIRATORY PROTECTION (5.3.2)

	Yes	No	N/A	N/O
37. High-speed abrasive tools are not used, unless fitted with engineering controls.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Materials containing cadmium are not sprayed on, unless controls limit airborne concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Respirators are used in areas where $EL \geq PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Respirator cartridges are replaced at the beginning of a shift or service life indicator, where available.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. PAPRs are provided to employees who request such a respirator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PERSONAL PROTECTIVE EQUIPMENT (5.3.3)

42. PPE is supplied at no cost to employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Clean and dry protective clothing is provided weekly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Protective clothing is repaired or replaced if found to be ineffective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Contaminated protective clothing is removed from change areas at the end of the shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Employee are not allowed to leave the workplace wearing clothing worn during work shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. All clothing requiring laundering is packaged in sealed, labeled containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Personnel or vendors who launder contaminated clothing are formally informed of the hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

[illegible]

Auditor: _____ Project Manager: _____



Attachment 3: Cadmium Fact Sheet

Cadmium Fact Sheet

Uses and Occurrences

The manufacture and transportation of cadmium compounds; coatings on metals; nickel-cadmium storage batteries; nickel plating, power transmission wire; pigments in ceramic glazes, enamels, and fungicides; corrosion-resistant coatings on marine, aircraft, and motor vehicles; manufacture of nuclear reactor rods; and welding electrodes and solder.

Physical Characteristics

Appearance:	Soft, blue-white, malleable, lustrous metal or grayish-white powder; some compounds may appear as a brown, yellow, or red powdery substance
Odor:	Odorless
Flammable:	Severe fire hazard, such as dust
Flash Point:	Not Applicable
Flammable Range:	Not Applicable
Specific Gravity:	8.64 (metal dust)
Stability:	Very stable
Incompatibilities:	Nitric acid, boiling concentrated hydrochloric and sulfuric acids; contact of cadmium metal dust with strong oxidizers or with elemental sulfur, selenium, and tellurium may cause fires and explosion.
Melting Point:	321°C (610°F)
Boiling Point:	765°C (1,409°F)

Signs and Symptoms of Exposure

Short-Term (Acute):	<u>Dust and Fume</u> : Irritation of nose and throat; inhalation may cause a delayed onset of cough, chest pain, sweating, chills, shortness of breath, and weakness. Death may occur. <u>Dust</u> : Ingestion may cause nausea, vomiting, diarrhea, and abdominal cramps.
Long-Term (Chronic):	<u>Dust and Fume</u> : Repeated or prolonged exposure may cause loss of sense of smell, ulceration of the nose, shortness of breath (emphysema), kidney damage, and mild anemia. Exposure to cadmium has been reported to cause an increase incidence of lung cancer.

Modes of Exposure

Inhalation:	Dusts and fumes
Absorption:	None
Ingestion:	Dusts and solids

Exposure Limits

Action level (AL)	2.5 µg/m ³
PEL	5 µg/m ³
STEL	None
TLV	10 µg/m ³ , 2µg/m ³ (respirable)

Exposure Level versus Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Cadmium standard and Training
EL > PEL	Implement all portions of the OSHA Cadmium Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye:	Splash-proof or dust-resistant goggles; face shield
Skin:	Protective coveralls, gloves, and footwear
Respiratory:	Air-purifying respirators and supplied air respirators, depending on the exposure

First Aid

Inhalation:	Move to fresh air; seek medical attention immediately.
Skin:	Remove clothing and shoes; wash with large amounts of water.
Eyes:	Flush with water immediately, lifting the upper and lower eyelids; seek medical attention immediately.
Ingestion:	DO NOT INDUCE VOMITING; seek medical attention immediately.



Lead

Enterprise Standard Operating Procedure HSE-508

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups must comply with when potentially exposed to airborne concentrations of lead during activities such as remediation, construction or abatement activities.

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control employee exposure to lead when exposures are at or above 30 $\mu\text{g}/\text{m}^3$ by implementing a program that meets the requirements of the OSHA Lead standard, 29 CFR 1910.1025 and 29 CFR 1926.62. The elements of the CH2M HILL lead program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical Surveillance
- Training on hazards of lead and control measures
- Record keeping requirements

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental and Occupational Safety and Health (OSHA) programs may have more stringent requirements. Contact the appropriate Responsible Business Group (BG) Health and Safety Manager (RHSM) or Environmental Manager (EM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by airborne lead concentrations regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);

- CH2M HILL provides oversight of subcontractor's operations which creates airborne lead concentrations

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedures that are applicable to this Lead SOP are as follows:

- [HSE-107, Hazard Communication](#)
- [HSE-113, Medical Surveillance](#)
- [HSE-117, Personal Protective Equipment](#)
- [HSE-119, Recordkeeping and Access to Records](#)
- [HSE-127, Respiratory Protection](#)
- [HSE-207, Exposure Assessment for Airborne Chemical Hazards](#)

3.0 Definitions

3.1 Action Level (AL)

"Action level" (AL) represents the airborne concentration of lead, without regard to the use of respirators, where certain regulatory requirements come into effect. Specifically, at or above the action level of 30 $\mu\text{g}/\text{m}^3$, exposure monitoring, medical monitoring and employee training is required.

3.2 Permissible Exposure Limit (PEL)

"Permissible exposure limit" (PEL) represents the level of lead airborne concentration (50 $\mu\text{g}/\text{m}^3$), without regard to the use of respirators, where all remaining regulatory requirements come into effect (e.g., written lead compliance program, regulated areas, and more extensive exposure and medical monitoring).

3.3 Exposure Limits

Exposure limits are based on 8-hour time weighted averages. If employees are exposed to lead for more than 8 hours in any work day, the employees' allowable exposure must be less than the PEL for any given 8-hour period during the extended work shift.

OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH) have established occupational exposure limits for lead. Each is identified in Table 1 below.

TABLE 1
Established Exposure Limits

Agency	Action level	PEL	TLV®
OSHA	30 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	N/A
ACGIH	NA	NA	50 $\mu\text{g}/\text{m}^3$ (for elemental Pb or as Pb for lead chromate) 150 $\mu\text{g}/\text{m}^3$ for lead arsenate

3.4 Threshold Limit Value (TLV)

The ACGIH has established a threshold limit value (TLV) of 50 µg/m³ [NOTE: In some cases, the ACGIH limits for airborne concentrations of contaminants are below the OSHA PEL. In such instances, CH2M HILL shall determine the feasibility of using the lower limit(s).]

4.0 Roles and Responsibilities

The HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Project Manager (PM)

The PM will provide the RHSM and SC, with project-specific information to determine what tasks or operations may potentially generate airborne lead concentrations. The PM will ensure the elements of this SOP are implemented including determining personal exposure monitoring, medical surveillance, training, and appropriate PPE, including respiratory protection, is acquired, worn and maintained by project employees.

4.2 Responsible Health and Safety Manager (RHSM)

The RHSM determines project lead monitoring requirements, provides control recommendations and assistance, selects appropriate PPE and respiratory protection, provides technical assistance to the SC for implementing the site-specific lead program, and conducts project Health and Safety (H&S) audits on the effectiveness of the project's written safety plan.

4.3 Safety Coordinator (SC)

The SC, with the technical support from the RHSM, assesses the project site for lead exposure, maintains exposure records in the project files when required, notifies employees of monitoring results, verifies PPE and respiratory protection is provided and worn, ensures project employees have completed training and medical surveillance as required, and requests input from project staff that the assigned PPE and respiratory protection meets ongoing requirements and effectiveness. The SC will serve as the Lead Competent Person for the project site.

4.4 Lead Competent Person

The Lead Competent Person is required to identify existing and potential lead hazards in the work environment and take prompt corrective action to eliminate or control such hazards. The designated "competent person" must be, at a minimum, able to:

- Determine, prior to beginning a job, whether lead is present in the workplace.
- Establish regulated areas and ensure that access to and from those areas is limited to authorized employees.
- Ensure the adequacy of any employee exposure monitoring required by this SOP.
- Ensure that all employees exposed to airborne lead levels above the PEL wear the appropriate personal protective equipment and are trained to use appropriate methods to control lead exposure

- Ensure that proper hygiene facilities are provided and that workers are trained to use these facilities.
- Ensure that required engineering controls are implemented, maintained in proper operating condition, and functioning properly.

5.0 Requirements

The following requirements, outlined in this Enterprise SOP, must be implemented when employees are exposed to lead during work activities.

A determination shall be made whether the scope of work to be performed presents lead as a hazard. Some sources of lead hazards include:

- Demolition or salvage of structures (e.g., lead flashing)
- Soil remediation with lead listed as a contaminant of concern
- New construction, alteration, repair or renovation of structures or their portions thereof may contain lead (e.g., lead pipe joints)
- Work activities involving cutting, grinding, burning, welding, and other abrasive operations performed on any painted or coated surfaces should be treated as having an increased potential for lead exposure

Surfaces or components suspected of containing lead shall be treated as lead unless documentation or testing results indicate otherwise.

5.1 Exposure Assessment

When airborne concentrations of lead are anticipated during work activities such as remediation, construction or demolition, an initial exposure assessment shall be conducted to determine employees' exposure to lead. Where objective data is available (within the last 12 months using the same methods/materials) that demonstrates that employee exposures to lead will not exceed airborne concentrations at or above the AL under expected site conditions, initial monitoring is not required.

- Initial exposure monitoring is conducted to document employees' breathing-zone exposures over the course of a full shift. A representative 8-hour TWA sample shall be collected for each job classification in each work area.
- When initial monitoring results are below the AL, monitoring may be suspended.
- When the initial monitoring indicates TWA results are equal to or greater than the AL but less than the PEL, personal monitoring of employees is required at least every 6 months.
- When initial monitoring results are greater than the PEL, additional monitoring, at least quarterly, for each employee involved is required.
- Personal monitoring (semi-annually or quarterly) may be halted when two consecutive samples taken 7 days apart are below the AL.

- Additional monitoring is required when there has been a change in production process, control equipment, personnel, or work practices that may result in new or additional exposures.
- Employees shall be informed in writing of exposure monitoring results within 5 working days after receipt of the results.
- In cases when the PEL has been exceeded, the notification to the affected employee shall include the control measures utilized to reduce the exposure to below the PEL. Report the incident in accordance with SOP [HSE-111, Incident Reporting and Investigation](#).

5.2 Control Methods

Methods to control exposure to lead (including engineering controls, administrative controls, PPE and combinations thereof) shall be implemented whenever lead is a hazard. Table 2 lists industrial operations where exposure to lead may occur and control methods that may be effective in each case. The following subsections provide additional information on each type of control method. These methods shall be documented in a written lead compliance program when airborne lead concentrations exceed the PEL.

TABLE 2:
Common Lead Operations and Controls

Operation	Controls
During excavation or drilling of contaminated soils	Dust suppression (e.g., water)
During demolition of structures	Dust suppression (e.g., water)
Removal or renovation of building infrastructure (e.g., fire suppression piping, or other process piping that may be painted with lead paint)	Exclude use of welding/cutting on pipes, remove paint in areas cuts are to be made, local exhaust ventilation, PPE
During the manufacture of insecticides, weed killers, and fungicides; during use as a wood preservative	Process enclosure, local exhaust ventilation, PPE
During use in the manufacture and handling of calcium arsenate; manufacture of electrical semiconductors, diodes, and solar batteries	Process enclosure, local exhaust ventilation, PPE
During use as a bronzing or decolorizing addition in glass manufacturing; in the production of opal glass and enamels	Process enclosure, local exhaust ventilation, PPE
During use as an addition to alloys to increase hardening and heat resistance	Process enclosure, local exhaust ventilation, PPE
During smelting of ores	Local exhaust ventilation, PPE

5.2.1 Engineering and Work Practice Controls

- Engineering and work practice controls, including administrative controls, shall be implemented to reduce and maintain employee exposure to lead to the lowest level achievable but no more than the PEL to the extent that such controls are feasible.

- Where mechanical ventilation is used to control exposure, an evaluation of the mechanical performance of the system in controlling exposure shall be conducted as necessary to maintain the system's effectiveness.
- If administrative controls are used to limit exposure, establish and implement a job rotation schedule that includes employee identification as well as the duration and exposure levels at each job or work station where each affected employee is located.
- Where all feasible engineering and work practice controls that can be instituted are not sufficient to reduce employee exposure to or below the PEL, such controls shall be used nonetheless to reduce employee exposure to the lowest feasible level and in conjunction with respiratory protection as described in Section 5.2.2.

5.2.2 Respiratory Protection

- Respiratory protection must be used during the following: periods when employee exposure to lead exceeds the PEL; work operations for which engineering and work-practice controls are not sufficient to reduce employee exposure to or below the PEL; periods when an employee requests a respirator; and periods when respirators are required to provide interim protection during initial exposure assessments.
- Respiratory protection selection shall be based on the most relevant exposure monitoring results.
- A respiratory protection program, including respirator selection, shall be implemented in accordance to OSHA 29 CFR 1910.134 and with CH2M HILL SOP [HSE-121, Respiratory Protection](#). Subcontractor respiratory protection programs shall meet or exceed these requirements.
- When air-purifying respirators are utilized, the HEPA filters shall be replaced at the beginning of each shift.
- Powered air-purifying respirators (PAPR) shall be provided to employees who request such a respirator and where it will provide adequate protection.

5.2.3 Personal Protective Equipment (PPE)

- Employees shall be provided, at no cost, protective work clothing and equipment including coveralls or similar full-body clothing, gloves, foot coverings, face shields, or vented goggles when working in regulated areas.
- Protective clothing shall be provided in a clean and dry condition at least weekly and daily to employees whose exposure levels are over 200 µg/m³ of lead.
- The employer shall clean, launder, or dispose of all protective clothing.
- The employer shall repair or replace protective clothing found to be ineffective.
- Removal of lead from protective clothing or equipment by blowing, shaking or any other means which dispenses lead into the air is prohibited.
- All contaminated clothing found in change rooms shall be removed at the end of each work shift.

- Personnel working in the vicinity of lead-contaminated soil shall wear disposable coveralls (or equal) and exercise enhanced personal hygiene (for example, frequent hand washing prior to eating, drinking, and smoking; separation of work and street clothing and footwear; etc.).
- Contact lenses should not be worn when working with lead.
- Employee shall not be allowed to leave the workplace wearing any protective clothing or equipment that is required during the work shift.
- All clothing requiring laundering will be packaged in a sealed container. Containers shall be labeled as follows: "CAUTION: CLOTHING CONTAMINATED WITH LEAD; DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD-CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS."
- Any person who cleans or launders protective clothing or equipment shall be informed in writing of the potentially harmful effects of exposure to lead.

5.3 Written Lead Compliance Program

When employee exposures are greater than the PEL, a written lead compliance program shall be established and implemented prior to commencement of operations within the scope of this SOP.

- The written program shall outline the plans for maintaining employee exposure below the PEL. Attachment 1, Subcontractor Safety Procedures Criteria-Lead, provides the requirements for written compliance program content.
- The compliance program shall be based on the most recent exposure monitoring data. The program shall be revised when exposure monitoring data is updated or at least annually to reflect the status of the program.
- The written compliance program shall be made available to all affected employees.

5.4 Regulated Areas

- Regulated areas shall be documented as part of the written lead compliance program.
- Regulated areas are those where airborne concentrations of lead are above the PEL without regard to the use of respirators. Personnel shall not enter regulated areas unless training, medical monitoring, and PPE, including respirator protection, requirements have been met.
- Regulated areas shall be demarcated and entry to these areas shall be limited. Only authorized personnel are allowed in these areas.
- The entrance to regulated areas shall be posted with signs that read "WARNING-LEAD WORK AREA-POISON-NO SMOKING OR EATING" so that necessary protective steps can be taken before entering regulated areas.
- Where feasible, shower facilities shall be installed and employees who work in regulated areas shall be required to shower at the end of the work shift. These facilities must be provided with an adequate supply of cleaning agents and towels.

- Hand washing facilities shall be provided for employees working in regulated areas. Furthermore, employees shall be required to wash their hands and face at the end of each work shift and prior to eating or entering eating facilities, drinking, smoking, or applying cosmetics.
- Employees shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in any areas where exposure to lead is above the PEL (that is, regulated areas).
- Eating facilities or areas shall be provided for employees working in regulated areas. These facilities shall be maintained free of lead contamination and readily accessible to employees.
- Change areas equipped with separate storage facilities for protective work clothing and equipment and for street clothing that prevents cross-contamination shall be provided for all employees working in regulated areas.
- In addition to the posting requirements, written or verbal notification to owners, contractors, and other personnel working in the area shall be made.

5.5 Housekeeping

- Where airborne lead concentrations exceed the PEL, housekeeping procedures shall be documented in the written lead compliance program.
- All surfaces shall be maintained as free as possible of accumulations of lead. Methods selected for cleaning of surfaces and floors shall be those that minimize the likelihood of lead becoming airborne (for example, vacuuming).
- Where vacuuming methods are selected, the vacuums shall be used and emptied in a manner that minimizes the reentry of lead into the workplace.
- Compressed air shall not be used to remove lead from any surface unless used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.
- Waste containing significant amounts of lead may be subject to hazardous waste regulations and the corresponding generation, treatment and disposal requirements. Refer to the [Waste Management Planning SOP, HSE-413](#), for information on how to determine whether the waste is considered hazardous waste.

5.6 Medical Surveillance

CH2M HILL shall make available initial medical surveillance (baseline) to employees occupationally exposed on any day to lead at or above the AL. Initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin (ZPP) levels.

All employees who are or will be exposed to airborne lead above the AL, without regard to respirator use, for more than 30 days in any consecutive 12 months shall be enrolled in CH2M HILL's medical surveillance program for lead and shall be performed in accordance with 29 CFR 1910.1025 and/or 29 CFR 1926.62.

Further information and details of the CH2M HILL medical surveillance program are provided in SOP HSE-113, Medical Monitoring, and SOP HSE-119, Recordkeeping and Access to Records.

Subcontractors are responsible for their employees receiving medical surveillance as required.

5.7 Records

Lead exposure monitoring records and medical surveillance records shall be maintained for 30 years or the duration of employment plus 30 years, according to HSE -119, Recordkeeping and Access to Records SOP. Further, according to HSE-119, employees shall be provided access to lead exposure and medical surveillance records upon request.

5.8 Subcontractor HSE Oversight

Where subcontractor equipment operations generate airborne lead concentrations at or above the AL without regard to respirator use, the subcontractor is responsible for reducing and maintaining the lead exposure to their employees below 50 µg/m³. The subcontractor is responsible for implementing suitable controls, including engineering, administrative, and PPE.

The “Subcontractor Safety Procedure Criteria – Lead” listed in Attachment 1 provides the minimum criteria, and may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor’s operations.

6.0 Training Requirements

CH2M HILL employees, who anticipate working on projects where they could be exposed to airborne lead above the AL without regard to respirator use, must complete the on-line Lead Exposure Module located on the HSE web page of the virtual office and project-specific lead-exposure-control training. The on-line training involves viewing computer based program and completing a quiz. On-line training objectives consist of:

- Where lead is typically encountered at CH2M HILL projects,
- Regulatory requirements, exposure limits,
- Potential hazards including toxicity and physical characteristics, and
- Medical monitoring requirements.

Project-specific lead-exposure-control training shall include the following:

- Discussion of site-specific lead hazards and associated control measures,
- Information contained in the Lead Fact Sheet (Attachment 3) and the site specific Health and Safety Plan or Field Safety Instruction created for the project,
- Quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations that could result in exposure to lead, as well as any necessary protective steps,
- Purpose, proper use, and limitation of respirators,
- Purpose and a description of the medical surveillance program,

- Engineering controls and work practices associated with the employee's job assignment, and
- A review of this standard by providing with a copy of the OSHA Lead Standard and appendices if requested by an employee.

Both the on-line and project specific training programs shall be repeated each year an employee is exposed at or above the action level.

7.0 Checklists and Forms

The “HSE Self-Assessment Checklist – Lead in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SC and provides this information in the project’s written safety plan. The RHSM shall assist the SC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor’s activities.

A Lead Fact Sheet is attached as Attachment 3 to provide basic awareness level information on lead. This information is not intended to replace or fulfill the requirements for maintaining lead material safety data sheets (MSDS) or completing training as discussed in Section 6.0.

8.0 References

The following regulations were referenced to prepare this Enterprise Standard Operating Procedure:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1025, Lead
- OSHA: 29 CFR 1926.62, Lead


9.0 Attachments

Attachment 1 [Subcontractor Safety Procedure Criteria – Lead](#)

Attachment 2 [Lead HSE Self Assessment Checklist](#)

Attachment 3 [Lead Fact Sheet](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	11/30/ 2007	Updated to Standard Operating Procedure	Sandy Wise; Jeff Stumpf	



Attachment 1: Subcontractor Safety Procedure Criteria

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor lead procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Lead Operation Procedures:

1. Provide the name and qualifications of the “competent person” responsible for all lead operations.
2. Provide the training records for personnel involved in operations where there is a potential or known exposure to lead above the action level.
3. Describe methods of identifying areas where lead may exist.
4. Describe methods of testing for lead content of painted or coated surfaces where welding, burning, cutting, grinding, brazing, sandblasting, or other abrasive operations will take place.
5. Provide medical surveillance approvals for individuals exposed to lead above the permissible exposure limit. Also provide medical approval for individuals required to wear negative pressure respirators.
6. Provide information pertaining to the development of an exposure assessment. The information should include the basis of sampling for compliance with the Lead Standard.
7. Provide background information when a negative exposure assessment is utilized.
8. Provide control methods utilized to minimize exposure to lead.
9. Provide a site-specific written compliance program addressing the following topics: Description of each activity in which lead is emitted; a description of the specific means that will be employed to achieve compliance such as engineering plans; a report of the technology considered in meeting the PEL; air monitoring data that documents the source of lead emissions; a detailed schedule of implementation of the program such as purchase order and construction contracts; a work practice program; an administrative control schedule; a description of arrangements to share information among contractors onsite pertaining to exposures to lead; and any other relevant information.



Attachment 2: HSE Self-Assessment Checklist



HSE Self-Assessment Checklist—Lead

Page 1 of 4

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to lead, or are required to perform oversight of a subcontractor whose personnel are exposed to lead.

CH2M HILL staff shall not direct the means and methods of subcontractor lead activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____		Project No.: _____	
Location: _____		PM: _____	
Auditor: _____		Date: _____	
Title: _____			
This specific checklist has been completed to:			
<input type="checkbox"/> Evaluate CH2M HILL compliance with its Lead program (SOP HSE-508)			
<input type="checkbox"/> Evaluate a CH2M HILL subcontractor's compliance with its Lead program			
Subcontractors Name: _____			

- Check "Yes" if an assessment item is complete/correct
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable
- Check "N/O" if an item is applicable but was not observed during the assessment

<u>SECTION 1</u>		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
PERSONNEL SAFE WORK PRACTICES (5.1)					
COMPLIANCE PROGRAM (5.3)					
1.	Where $EL \geq PEL$, a written compliance program is implemented prior to commencing work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	The compliance program is based on the most recent air monitoring/sampling results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	The compliance program is updated for new exposure monitoring data or annually.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Written compliance program is available to all affected employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Waste generated must be determined if considered hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EMPLOYEE INFORMATION (5.2.1)					
6.	CH2M HILL personnel have completed the Lead Training Module	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	The selection of the appropriate respirator is based on the airborne lead concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Personnel working near lead-contaminated soil or material shall use wet methods and work practices to control dust; wear disposable coveralls and exercise personal hygiene practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Contact lenses are not worn when working with lead	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
REGULATED AREAS (5.4)				
11. Written or verbal notification to owners, contractors or other personnel working in the area of lead work activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Areas that exceed the PEL have been designated as regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Personnel meet medical and training requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. No eating, drink, and/or smoking are allowed in the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Warning signs have been posted at all entrances to the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Shower facilities installed and used with cleaning agents and towels, where feasible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Hand washing facilities provided for use by employees prior to eating, drinking, smoking, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Eating facilities free of lead provided for employees working in regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Change areas provided where $EL \geq PEL$ or where employees are subject to eye or skin irritation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOUSEKEEPING (5.5)				
20. All surfaces are free of accumulation of lead.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Cleaning methods minimize airborne lead activity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Where vacuuming is used, vacuums are used and emptied as to minimize airborne lead.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Compressed air not used to remove lead from surfaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EXPOSURE ASSESSMENTS (5.1)				
24. Initial air monitoring conducted over full shift for each job classification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Air sampling conducted every six months when exposure limit (EL) $\geq AL$ but $< PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Air sampling of employees conducted quarterly when $EL \geq PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Additional air monitoring has been collected when there are any changes in operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Employees have been informed of air monitoring results within 5 days after receipt of results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Where PEL is exceeded, affected employees have been notified of results and control measures to be utilized to reduce exposure below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL METHODS (5.2)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.2.1)				
30. Engineering controls and work practices have been utilized to reduce exposures below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Mechanical ventilation performance evaluated when used to control exposure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Job rotation schedule established, when using administrative controls.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. When controls are unable to reduce exposures below the PEL, respiratory protection is utilized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATORY PROTECTION (5.2.2)				
34. Respirators are used in areas where $EL \geq PEL$.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Respirator filters are replaced at the beginning of shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. PAPRs are provided to employees who request such a respirator.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
PERSONAL PROTECTIVE EQUIPMENT (5.2.3)				
37. PPE is supplied at no cost to employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Clean and dry protective clothing is provided weekly, daily if $EL \geq 200 \mu\text{g}/\text{m}^3$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Protective clothing is repair or replaced if found to be ineffective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. PPE is not blown, shook or other methods used to clean...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Employee not allowed to leave workplace wearing clothing worn during work shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Contaminated protective clothing is removed from change areas at the end of the shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. All clothing requiring laundering is packaged in sealed, labeled containers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Personnel or vendors who launder contaminated clothing are formally informed of the hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2

Complete this section for all items checked “No” in Section 1. Deficient items be corrected in a timely manner.

[illegible]

Auditor: _____ Project Manager: _____



Attachment 3: Lead Fact Sheet

Uses and Occurrences

Lead can be found in the following: construction materials for tank linings and piping; component of lead-acid storage batteries; lead solder; plastics; steel; and pigments for paints. Lead can also be found in waste rock associated with mining activities, wood debris or stock used for electrical co-generation activities, and soil and waste associated with manufacturing activities. Elevated levels of naturally occurring lead may also be found in the soil in certain parts of this country.

Physical Characteristics

Appearance:	Bluish-white, silvery, gray metal. Very soft and easily malleable
Odor:	None
Flammable:	Noncombustible
Flash Point:	Not Applicable
Flammable Range:	Not Applicable
Specific gravity:	11.35
Stability:	very stable
Incompatibilities:	Strong oxidizers, hydrogen peroxide, acids
Melting Point:	327°C (621°F)

Signs and Symptoms of Exposure

Ingestion and Inhalation: (Short Term): Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise that develops quickly to seizures, coma, and death from cardio-respiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects that take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease that arise after periods of exposure as short as days or as long as several years.

(Long Term: Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness,

dizziness, hyperactivity and colic. In lead colic, there may be severe abdominal pain.

Skin and Eye: Irritation

Modes of Exposure

Inhalation: Dusts and fumes
Skin Absorption: None
Ingestion: Dusts and solids

Exposure Limits

Action level 30 µg/m³
PEL 50 µg/m³
STEL None
PEL-C None
TLV 50 µg/m³

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL less than Action Level (AL)	Maintain exposure as low as reasonably achievable
EL greater than AL and less than PEL	Implement portions of the OSHA Lead Standard (i.e., initial medical monitoring) and Training
EL greater than PEL	Implement all portions of the OSHA Lead Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety Glasses
Skin: Coveralls or disposable coveralls to keep lead off clothing and to prevent the spread of lead contamination.
Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air, contact a physician
Skin: Wash with water
Eyes: Flush with water
Ingestion: Contact a physician



Vinyl Chloride

Enterprise Standard Operating Procedure HSE-512

1.0 Purpose

This Enterprise Health Safety Environment (HSE) Standard Operating Procedure (SOP) describes the requirements that CH2M HILL Legal Entities and Business Groups must comply with when potentially exposed to airborne concentrations with vinyl chloride due to site operations.

2.0 Scope and Application

2.1 Scope

CH2M HILL is required to control employee workplace exposure to vinyl chloride when personal exposures are at or above 1.0 ppm as an 8-hour time-weighted average (TWA) or above 5.0 ppm short term exposure limit (STEL), by implementing a program that meets the requirements of the Occupational Safety and Health Administration (OSHA) Vinyl Chloride standard, 29 CFR 1910.1017. The elements of the CH2M HILL vinyl chloride program include the following:

- Exposure monitoring
- Methods of control, including personal protective equipment (PPE) and respirators
- Medical surveillance
- Training on hazards of vinyl chloride and control measures
- Record keeping requirements

2.2 Application

This SOP applies Enterprise-Wide to all CH2M HILL Legal Entities and Business Groups, their employees, subcontractors and their lower-tier subcontractors that operate in the United States (US) and internationally.

Some state environmental or OSHA programs may have more stringent requirements. Contact the appropriate Responsible Health and Safety Manager (RHSM) or Responsible Environmental Manager (REM) to address these specific requirements. This SOP should be used as a starting point for international operations, but country-specific health, safety and environmental (HSE) regulations shall prevail, and a country-specific SOP should be developed to comply with these specific HSE regulations.

This Enterprise SOP applies when:

- CH2M HILL Employees are exposed to the hazards posed by vinyl chloride levels at or above 1.0 ppm as an 8-hour time-weighted average or above 5.0 ppm short term

exposure limit (STEL), regardless of the company responsible for the operations (CH2M HILL, subcontractor or third party contractor);

- CH2M HILL provides oversight of subcontractor's operations which creates vinyl chloride levels at or above 1.0 ppm as an 8-hour time-weighted average or above 5.0 ppm short term exposure limit (STEL).

2.3 Applicable Enterprise SOPs

Applicable Enterprise Standard Operating Procedures that are applicable to this vinyl chloride SOP are as follows:

- [HSE-107, Hazard Communication](#)
- [HSE-113, Medical Surveillance](#)
- [HSE-117, Personal Protective Equipment](#)
- [HSE-119, Recordkeeping and Access to Records](#)
- [HSE-127, Respiratory Protection](#)
- [HSE-207, Exposure Assessment for Airborne Chemical Hazards](#)

3.0 Definitions

3.1 Action Level (AL)

"Action level" (AL) represents the airborne concentration of vinyl chloride, without regard to the use of respirators, where certain regulatory requirements come into effect. Specifically, at or above the action level of 0.5 ppm, medical monitoring and employee training is required.

3.2 Permissible Exposure Limit (PEL)

"Permissible exposure limit" (PEL) represents the level of vinyl chloride airborne concentration above 1.0 ppm, without regard to the use of respirators, where all remaining regulatory requirements come into effect.

3.3 Short Term Exposure Limit (STEL)

"Short term exposure limit" (STEL) represents the level of vinyl chloride airborne concentration above 5.0 ppm over a 15-minute period, without regard to the use of respirators, where all remaining regulatory requirements come into effect.

3.4 Exposure Limits

Exposure limits are based on 8-hour time weighted averages and 15 minute averages. If employees are exposed to vinyl chloride for more than 8 hours in any work day, the employees' allowable exposure must be less than the PEL for any given 8-hour period during the extended work shift.

- OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH) have established occupational exposure limits for vinyl chloride. Each is identified in Table 1 below.

Agency	Action level	PEL	STEL/ CEILING	TLV®
OSHA	0.5 ppm	1 ppm	5 ppm STEL	N/A
ACGIH	N/A	N/A	N/A	1 ppm

3.6 Threshold Limit Values (TLV)

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value (TLV®) of 1.0 ppm 8-hour TWA, the same value as OSHA. *[NOTE: In some cases, the ACGIH limits for airborne concentrations of contaminants are below the OSHA PEL. In such instances, CH2M HILL shall determine the feasibility of using the lower limit(s).]*

4.0 Roles and Responsibilities

The role and responsibilities provided in the HSE Responsibilities Core Standard applies to this SOP. Only HSE roles and responsibilities specific to implementing this SOP are detailed in this section.

4.1 Project Manager (PM)

The PM will provide the RHSM and SC, with project-specific information to determine what tasks or operations may potentially generate airborne vinyl chloride. The PM will ensure the elements of this SOP are implemented including determining personal exposure monitoring, medical surveillance, training, and appropriate PPE, including respiratory protection, is acquired, worn and maintained by project employees.

4.2 Responsible Health and Safety Manager (RHSM)

The responsible Health and Safety Manager (RHSM) determines project vinyl chloride monitoring requirements, provides control recommendations and assistance, selects appropriate PPE and respiratory protection, provides technical assistance to the SC for implementing the site-specific vinyl chloride program, and conducts project Health and Safety (HS) audits on the effectiveness of the project's written safety plan.

4.3 Safety Coordinator (SC)

The SC, with the technical support from the RHSM, assesses the project site for vinyl chloride exposure, maintains exposure records in the project files when required, notifies employees of monitoring results, verifies PPE and respiratory protection is provided and worn, ensures project employees have completed training and medical surveillance as required, and requests input from project staff that the assigned PPE and respiratory protection meets ongoing requirements and effectiveness.

5.0 Requirements

The following requirements, outlined in this Enterprise SOP, must be implemented when employees are exposed to airborne vinyl chloride concentrations at or above PEL or STEL, without regard to respirator use.

5.1 Safe Work Practices

The following safe work practices are to be followed by CH2M HILL regardless of the company responsible for the operation (CH2M HILL, subcontractor or third party contractor). These safe work practices also pertain to subcontractor personnel when CH2M HILL is providing oversight.

5.1.1 Compliance Program

- When exposures are greater than the PEL, a written compliance program shall be established and implemented prior to commencement of operations within the scope of this SOP.
- The written program shall outline the plans for maintaining employee exposure below the PEL. Attachment 1: Subcontractor Safety Procedures Criteria- Vinyl Chloride provides the requirements for written compliance program content.
- The compliance program shall be based on the most recent exposure monitoring data. The program shall be revised when exposure monitoring data is updated to reflect the status of the program or at a minimum on an annual basis.
- The written compliance program shall be made available to all affected employees.
- Waste containing significant amounts of vinyl chloride may be subject to hazardous waste regulations and the corresponding generation, treatment and disposal requirements. Refer to the Waste Management Planning SOP HSE-413 for information on how to determine whether the waste is considered hazardous waste.

5.1.2 Employee Information

- A Vinyl Chloride Fact Sheet is attached as Appendix 3 to provide basic awareness level information on vinyl chloride. This information is not intended to replace or fulfill the requirements for maintaining vinyl chloride material safety data sheets (MSDS).
- Respiratory protection selection shall be based on the most relevant exposure monitoring results.
- In addition to the posting requirements, written or verbal notification to owners, contractors, and other personnel working in the area shall be made.
- Containers of waste contaminated with vinyl chloride shall be legibly labeled: CONTAMINATED WITH VINYL CHLORIDE. CANCER-SUSPECT AGENT
- Containers of polyvinyl chloride shall be legibly labeled: POLYVINYL CHLORIDE (OR TRADE NAME) CONTAINS VINYL CHLORIDE. VINYL CHLORIDE IS A CANCER-SUSPECT AGENT
- Containers of vinyl chloride shall be legibly labeled either: VINYL CHLORIDE EXTREMELY FLAMMABLE GAS UNDER PRESSURE CANCER-SUSPECT AGENT or CANCER-SUSPECT AGENT.

5.1.3 Regulated Areas

- Regulated areas are those where airborne concentrations of vinyl chloride are above the permissible exposure limit (PEL) or the short term exposure limit (STEL), without regard to the use of respirators. Personnel shall not enter regulated areas unless training, medical monitoring, and PPE, including respirator protection, requirements have been met.
- Regulated areas shall be demarcated and entry to these areas shall be limited. Only authorized personnel are allowed in these areas.
- In regulated areas where employees are exposed to vinyl chloride above the PEL, warning signs shall be posted as follows: CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY.

5.2 Exposure Assessment

- An exposure assessment is required when employees may be exposed to vinyl chloride at or above the action level and above the STEL, to determine the extent to which employees are exposed and the appropriate exposure controls required.
- An initial determination of exposure shall be made at the commencement of operations. The determination shall consist of the collection of personal air samples representative of a full shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure level.
- Initial monitoring shall be repeated when there is a change in production, equipment, process, personnel, or control measures, which may result in new or additional exposure.
- In cases when employees report signs or symptoms of respiratory or dermal conditions associated with vinyl chloride exposure, personnel shall be promptly monitored for exposure.
- Periodic monitoring shall be conducted when initial monitoring results in exposures at or above the action level every 6 months. If initial monitoring results in exposures above the PEL, periodic monitoring must be conducted every 3 months (quarterly).
- Monitoring for the STEL will be repeated at a frequency determined by the RHSM.
- Exposure monitoring can be discontinued when the results of two consecutive sampling periods, taken at least seven days apart show that exposure is below the action level.
- Employees or their designated representatives shall be afforded reasonable opportunity to observe the monitoring and measuring required.
- Within 15 working days following any monitoring which shows employees exposed above the PEL, each such employee shall be notified in writing of the results of the exposure measurement and the steps being taken to reduce the exposure to within the PEL.

5.3 Control Methods

- Table 2 lists industrial operations where exposure to vinyl chloride may occur and control methods that may be effective in each case.

Table 2. Common Vinyl Chloride Operations and Controls

Operation	Controls
During the manufacture of monomer, polymer, copolymer, and terpolymer.	Process enclosure, personal protective equipment (PPE).
During the transfer of monomer to tank cars or polymerization reactors; during maintenance work on tanks or reactors.	Local exhaust ventilation, PPE.
During the cleaning of polymerization reaction tanks	Process enclosure, PPE.

5.3.1 Engineering and Practice Controls

- Engineering and work practice controls, including administrative controls, shall be implemented to reduce and maintain employee exposure to vinyl chloride at or below the PELs (TWA and STEL) to the extent that such controls are feasible.
- Where all feasible engineering and work practice controls that can be instituted are not sufficient to reduce employee exposure to or below the PELs, such controls shall be used nonetheless to reduce employee exposure to the lowest feasible level and in conjunction with respiratory protection as described in Section 5.3.2.
- Employees shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in any areas where exposure to vinyl chloride is above the PEL or STEL (i.e., regulated areas).
- All employees engaged in repair and cleanup of spills shall wear suitable personal protective equipment and be trained in proper methods of cleanup and decontamination according to the action plan in the site-specific plan.
- Vinyl chloride-contaminated waste and debris resulting from leaks or spills shall be placed for disposal in sealed containers bearing a label warning of vinyl chloride's presence and of the associated hazards.

5.3.2 Respiratory Protection

- Respiratory protection must be used during periods when employee exposure to vinyl chloride is equal to or exceeds the PELs (TWA or STEL), during work operations for which engineering or work practice controls are not sufficient to reduce employee exposure to or below the PEL, during periods when an employee requests a respirator, and when respirators are required to provide interim protection during initial exposure assessments.
- A respiratory protection program, including respirator selection, shall be implemented in accordance with OSHA 29 CFR 1910.134 and with CH2M HILL SOP HSE-121, Respiratory Protection. Subcontractor respiratory protection programs shall meet or exceed these requirements.

- When air purifying respirators are utilized, the cartridges shall be replaced based on a cartridge change-out schedule developed by the RHSM or at the beginning of each shift, whichever comes first.

5.3.3 Personal Protective Equipment (PPE)

- Employees shall be provided, at no cost, protective work clothing and equipment to protect employees against eye contact and dermal contact to liquid vinyl chloride.
- The selection of appropriate PPE shall be made based on the form of vinyl chloride encountered, the conditions of use, and the hazards present.
- Protective garments shall be provided clean and dry for each use. If damaged, protective clothing must be repaired or replaced.
- Employees shall not be allowed to leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift.
- Vendors or personnel who clean or launder protective clothing or equipment shall be informed in writing of the potentially harmful effects of exposure to vinyl chloride
- In areas where an emergency exists, warning signs shall be posted as follows: CANCER-SUSPECT AGENT IN THIS AREA-PROTECTIVE EQUIPMENT REQUIRED-AUTHORIZED PERSONNEL ONLY.

5.4 Medical Surveillance

CH2M HILL shall institute medical surveillance for any employees who are or will be exposed to airborne vinyl chloride:

- At or above the action level, without regard to respirator use, or
- At or above the permissible exposure levels (PELs)

Medical Surveillance shall be conducted upon initial assignment to a site where exposures are in excess of the action level and annually thereafter. If an employee has been on vinyl chloride sites for 10 years or longer, medical surveillance will be conducted on a six month interval.

Further information and details of the CH2M HILL medical surveillance program are provided in SOP HSE-113 Medical Monitoring and SOP HSE-1119, Recordkeeping and Access to Records.

Subcontractors are responsible for ensuring their employees receive medical surveillance as required.

5.5 Records

Vinyl Chloride exposure monitoring and medical surveillance records shall be maintained according to HSE -119, Recordkeeping and Access to Records, as well as employees shall be provided access to vinyl chloride exposure and medical surveillance records upon request.

5.6 Subcontractor HSE Oversight

Where subcontractor equipment operations generate airborne vinyl chloride concentrations at or above the action level without regard to respirator, the subcontractor is responsible for reducing and maintaining the vinyl chloride exposure to their employees below 0.5 ppm. The subcontractor is responsible for implementing suitable controls, including engineering, administrative, and PPE.

The “Subcontractor Safety Procedure Criteria – Vinyl Chloride” listed in Attachment 1 provides the minimum criteria, and may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor’s operations.

6.0 Training Requirements

CH2M HILL employees, who anticipate working on projects where they could be exposed to airborne vinyl chloride above the action limit without regard to respirator use, must complete the on-line “Vinyl Chloride” training module located on the HSE web page of the virtual office project-specific Vinyl Chloride-exposure-control training. The on-line training involves viewing computer based program and completing a quiz. On-line training objectives consist of:

- Where vinyl chloride is typically encountered at CH2M HILL projects,
- Regulatory requirements, exposure limits,
- Potential hazards including toxicity and physical characteristics, and
- Medical monitoring requirements.

Project-specific vinyl chloride - exposure-control training shall include the following:

- Discussion of site-specific vinyl chloride hazards and associated control measures,
- Information contained in the Vinyl Chloride Fact Sheet (Attachment 3) and the site specific Health, Safety, and Environmental Protection Plan or Field Safety Instruction created for the project,
- Quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations that could result in exposure to vinyl chloride, as well as any necessary protective steps,
- Purpose, proper use, and limitation of respirators,
- Purpose and a description of the medical surveillance program,
- Engineering controls and work practices associated with the employee's job assignment, and
- A review of this standard by providing with a copy of the OSHA Vinyl Chloride Standard and appendices if requested by an employee.

Both the on-line and project specific training programs shall be repeated each year an employee is exposed at or above the action level.

7.0 Checklists

The “HSE Self-Assessment Checklist— Vinyl Chloride in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM specifies the frequency in which this checklist shall be completed by the SC and provides this information in the project’s written safety plan. The RHSM shall assist the SC in resolving any deficiencies identified during the self-assessment. The RHSM may also use this checklist when performing HS audits at CH2M HILL projects, including subcontractor’s activities.

8.0 References

The following regulations were referenced to prepare this Enterprise Standard Operating Procedure:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1910.1017, Vinyl Chloride


9.0 Attachments

Attachment 1: [Subcontractor Safety Procedures Criteria – Vinyl Chloride](#)

Attachment 2: [HSE Self-Assessment Checklist – Vinyl Chloride](#)

Attachment 3: [Vinyl Chloride Fact Sheet](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	9/10/2007	Updated to Standard Operating Procedure	Jeff Stumpf	



Attachment 1: Subcontractor Safety Procedure Criteria—Vinyl Chloride

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor vinyl chloride procedures. Subcontractors are expected to address the following items in their safety procedures.

Minimum Acceptable Criteria for Subcontractor Vinyl Chloride Operation Procedures:

1. Provide the training records for personnel involved in operations where there is a potential or known exposure to vinyl chloride above the action level.
2. Provide medical surveillance approvals for individuals exposed to vinyl chloride above the permissible exposure limit. Also provide medical approval for individuals required to wear tight fitting respirators.
3. Provide information pertaining to the development of an exposure assessment. The information should include the basis of sampling for compliance with the Vinyl Chloride Standard.
4. Provide background information when a negative exposure assessment is used.
5. Provide control methods used to minimize exposure to vinyl chloride.
6. Provide a copy of the written respiratory protection program when respiratory protection is anticipated to be used.
7. Provide a written compliance program addressing the following topics:
 - Description of each activity in which vinyl chloride is emitted.
 - Description of the specific means that will be employed to achieve compliance such as engineering plans.
 - A report of the technology considered in meeting the PEL.
 - An air monitoring data, which documents the source of vinyl chloride emissions.
 - A detailed schedule of implementation of the program such as purchase order and construction contracts.
 - A work practice program.
 - An administrative control schedule.
 - Description of arrangements to share information amongst contractors onsite pertaining to exposures to vinyl chloride.
 - Any other relevant information.
 - Description of methods used to dispose vinyl chloride-containing waste.



Attachment 2: HSE Self-Assessment Checklist



OPERATING PROCEDURE Self-Assessment Checklist -Vinyl Chloride

Page 1 of 3

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to vinyl chloride, or are required to perform oversight of a subcontractor whose personnel are exposed to vinyl chloride.

CH2M HILL staff shall not direct the means and methods of subcontractor vinyl chloride activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____		Project No.: _____	
Location: _____		PM: _____	
Auditor: _____		Title: _____ Date: _____	
This specific checklist has been completed to:			
<input type="checkbox"/> Evaluate CH2M HILL compliance with its Vinyl Chloride program (SOP HSE-512)			
<input type="checkbox"/> Evaluate a CH2M HILL subcontractor's compliance with its Vinyl Chloride program			
Subcontractors Name: _____			

- Check "Yes" if an assessment item is complete/correct
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable
- Check "N/O" if an item is applicable but was not observed during the assessment

<u>SECTION 1</u>		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
PERSONNEL SAFE WORK PRACTICES (5.1)					
COMPLIANCE PROGRAM (5.1.1)					
1.	A written compliance program is established for work above the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	The compliance program includes means of maintaining exposures below the PEL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	The compliance program is based on the most recent air monitoring results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Written compliance program is available to all affected employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Waste generated must be determined if considered hazardous waste.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EMPLOYEE INFORMATION (5.1.2)					
6.	CH2M HILL personnel have completed the Vinyl Chloride Training Module.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	The selection of the appropriate respirator is based on the airborne vinyl concentration.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Written or verbal notification to owners, contractors or other personnel working in the area of vinyl chloride work activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Storage, waste or shipping containers have been properly labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
REGULATED AREAS (5.1.3)				
11. Areas that exceed the PELs (TWA or STEL) have been designated as regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Personnel do not enter regulated areas unless they meet training, medical and PPE requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Warning signs have been posted at all entrances to the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exposure Assessment (5.2)				
14. Initial air monitoring (TWA & STEL) conducted over full shift for each job classification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Air monitoring has been repeated when a change in production or controls occurred.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Personnel exhibiting signs of exposure have been monitored.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. EL > AL have been resampled in the last 6 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. EL ≥ PEL have been resampled in the 3 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Air monitoring results above the STEL have been resampled according to frequency established by RHSM.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Employees are given opportunities to observe monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Relevant employees are notified within 15 days in writing of the results of monitoring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CONTROL METHODS (5.3)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)				
22. Engineering controls and work practices are implemented to reduce exposures to below the PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Engineering and work practices are implemented to achieve the lowest feasible exposures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Employees are not allowed to eat, drink or smoke in regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Action plans have been developed to respond to spills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Employees responding to spills have been trained and supplied with PPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Vinyl chloride-contaminated waste is properly handled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RESPIRATORY PROTECTION (5.3.2)				
28. Respirators are used in areas where EL ≥ PEL.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. A written respiratory protection program is in place where respirators are used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Cartridges changed based on change schedule or at the beginning of each shift.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Protective Equipment (5.3.3)				
31. PPE is provided by the employer at no cost to employees.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. PPE is selected based on the materials, conditions, and hazards present.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. PPE is provided clean and dry for each use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Personnel who clean or launder protective clothing are informed in writing of the hazards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Attachment 3: Vinyl Chloride Fact Sheet

Uses and Occurrences—Polyvinyl chloride and copolymers, organic synthesis, adhesives for plastics, and as a precursor in the production of the common plastic polyvinyl chloride (PVC). It is often a degradation product of a number of chlorinated compounds, including tetra-chloroethylene and trichloroethylene, at hazardous waste sites in soils and groundwater. It can also be a breakdown product of the combustion of PVC or other chlorinated compounds.

Physical Characteristics

Appearance:	Colorless gas
Odor:	Sweet; Odor threshold: 3,000 ppm
Flammable:	Class IA Flammable Liquid Gas; NFPA Rating: 4
Flash Point:	-78 °C (-108°F)
Flammable Limits:	3.6% - 33.0% (% by volume in air)
Specific gravity:	0.91; (water = 1.0)
Stability:	Stable under ordinary conditions of use and storage
Vapor Pressure:	2300 mm Hg (at 20 °C)
Incompatibilities:	Atmospheric oxygen and strong oxidizers may react to produce peroxide, which can initiate a violent polymerization reaction
Melting Point:	-155.7 °C (-248°F)
Boiling Point:	-14 °C (7°F)

Signs and Symptoms of Exposure

Inhalation:	<u>Short Term:</u> Dizziness, light-headedness, nausea, dullness of visual and auditory responses, drowsiness, and unconsciousness <u>Long Term:</u> Thickening of skin, contact and allergic dermatitis, fatigue, coughing and sneezing, abdominal pain, gastrointestinal bleeding, nausea, vomiting, indigestion, diarrhea, jaundice, weight loss, anorexia, and cold and tingling sensations of the hands and feet, carcinogen.
Skin contact:	<u>Short Term:</u> Skin contact with liquid can cause frostbite. <u>Long Term:</u> Dermatitis
Eye contact:	Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.

Modes of Exposure

Inhalation:	Vapor
Absorption:	Liquid causes frostbite
Ingestion:	Ingestion of contaminated water

Exposure Limits

Action level	0.5 ppm
PEL	1 ppm
STEL	None
PEL-C	5 ppm
TLV	1 ppm

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
EL > AL, EL < PEL	Implement portions of the OSHA Vinyl chloride standard and Training
EL > PEL	Implement all portions of the OSHA Vinyl Chloride Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye:	Safety glasses, chemical goggles, face shield
Skin:	Tychem SL or other full-body clothing, depending on the exposure. Nitrile, Viton or laminated film gloves.
Respiratory:	Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation:	Move to fresh air, begin rescue breathing if breathing has stopped and CPR if heart action has stopped, transfer promptly to a medical facility.
Skin:	Immerse affected part in warm water. Seek medical attention.
Eyes	Flush with large amounts of water for at least 15 minutes. Seek medical attention immediately.
Ingestion:	Contact a physician.



Hexavalent Chromium - Chromium VI

Enterprise Standard Operating Procedure HSE 513

1.0 Introduction

This Standard Operating Procedure outlines the requirements that CH2M HILL Legal Entities and Business Groups (BGs) must comply with when implementing a program to evaluate and control worker exposure to hexavalent chromium (Cr VI).

This SOP provides information and the process to follow to recognize, evaluate, and control employee exposure to Cr VI at CH2M HILL project locations.

1.1 References

The following programs, regulations, and sources were consulted to prepare this Enterprise Standard Operating Procedure:

- Occupational Exposure to Hexavalent Chromium – Federal Register Number 71:10099-10385, U.S. Department of Labor, Final Rule, 29 CFR 1910.1026 and 29 CFR 1926.1126, Chromium VI
- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Final Rule, 29 CFR 1910.1026, and 29 CFR 1126, Chromium VI

2.0 Scope and Application

This SOP applies enterprise-wide to all CH2M HILL legal entities and BGs, their employees, subcontractors, and lower-tier subcontractors that operate in the United States (U.S.) and internationally.

Where state OSHA agencies may have more stringent requirements, contact the appropriate Responsible Business Group (BG) Health and Safety Lead to address these specific requirements. For international operations, this SOP should be followed as a minimum requirement but country-specific H&S regulations (i.e., Canada or Australia) shall prevail, and a country-specific SOP should be developed to comply with these specific H&S regulations.

This Enterprise SOP applies when employees may be exposed to Cr VI due to the following activities:

- CH2M HILL employees who may be exposed to Cr VI when performing hot work such as welding on stainless steel or Cr VI painted surfaces, traffic painting or paint removal containing Cr VI, refractory brick restoration, or soil disturbance activities such as drilling or from heavy equipment moving on soils containing Cr VI soils.
- CH2M HILL workers who may be exposed to Cr VI when working at project sites or in proximity to Cr VI related operations such as electroplating, painting (aerospace

and autobody repair), chromate pigment and chemical production, chromium dye and catalyst production, glass manufacturing, or plastic colorant production. (CH2M HILL, subcontractor, or third-party contractor employees)

- CH2M HILL provides oversight of subcontractor's activities where worker exposure to Cr VI can occur.

2.1 Applicable Enterprise SOPs

Other Enterprise SOPs that may be applicable to worker exposure to Cr VI include the following:

- Abrasive blasting on surfaces containing Chromium VI creating airborne dispersion of Chromium VI compounds and resulting in worker exposure
- Contracts, subcontracts, and HSE management practices for subcontractor workers who perform tasks that could result in exposure to Cr VI
- Operations or tasks involving exposure to Cr VI in confined spaces
- Worker decontamination when Cr VI materials may adhere to workers' skin or clothing or to personal protective equipment worn by them
- Disposal of personal protective equipment (PPE) or other debris contaminated by chromium compounds.
- Demolition where materials containing Cr VI could become airborne and present a potential worker exposure
- Exposure assessment for employee exposure to Cr VI
- Medical monitoring and access to records for employees exposed to Cr VI
- Wearing respiratory protection as a control measure to minimize employee exposure to Cr VI to acceptable concentrations
- Employee training on the hazards and exposure prevention measures to Cr VI

3.0 Definitions

3.1 Action Level (AL)

The action level for implementation of this SOP is a concentration of airborne Cr VI of 2.5 micrograms per cubic meter ($2.5\mu\text{g}/\text{m}^3$) of air calculated as an 8-hour time-weighted average (TWA).

3.2 Chromium VI or Hexavalent Chrome

Chromium with a valence of positive six, in any form and in any compound.

3.3 Emergency Release

Any activity that results or is likely to result in an uncontrolled release of Cr VI. If an incidental release of Cr VI (measured at or below the Permissible Exposure Limit) can be controlled at the time of release by workers in the immediate release area, it is not an emergency.

3.4 Worker Exposure

The exposure to airborne Cr VI that would occur if the worker was not using respiratory protection.

3.5 High-Efficiency Particulate Air (HEPA) Filter

Filter that is at least 99.97 percent (%) efficient in removing mono-dispersed particles of 0.3 micrometers (μm) in diameter or larger.

3.6 Historical Monitoring Data

Hexavalent chromium exposure assessment monitoring conducted prior to May 30, 2006, obtained during work operations conducted under workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

3.7 Objective Data

Information such as air monitoring data from industry-wide surveys or calculations based on the composition or chemical and physical properties of a substance demonstrating the worker exposure to Cr VI associated with a particular product or material or a specific process, operation, or activity. The data must reflect workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

3.8 Permissible Exposure Limit (PEL)

The level of worker exposure to an airborne concentration of Cr VI, without regard to the use of respirators, at 5 micrograms per cubic meter of air ($5 \mu\text{g}/\text{m}^3$) calculated as an 8-hour time-weighted average (TWA) that cannot be exceeded.

4.0 Roles and Responsibilities

The following sections outline the roles and responsibilities for individuals when applying this SOP.

4.1 Business Group (BG) H&S Leads

The Business Group (BG) Health and Safety (H&S) Leads are responsible for assisting BG Management and Project Managers in implementing this SOP for all projects in their BG where there is a potential for worker exposure to Cr VI. The BG H&S Lead has the authority to approve deviations from this standard to accommodate additional domestic and international requirements.

4.2 Project Manager

The CH2M HILL project manager (PM) is responsible for implementing this procedure and providing adequate resources (budget and staff) for project-specific implementation of the H&S management process on projects where there is a potential for worker exposure to Cr VI. The PM has overall H&S management responsibility, but may delegate specific tasks to other project staff. The PM retains ultimate H&S responsibility for the project.

4.3 Site Manager

The CH2M HILL on-site manager is responsible for all field operations onsite and is typically the Construction Manager (CM), Site Superintendent, Site Supervisor, or Field Team Leader. The Site Manager is directly responsible for implementing all aspects of the project H&S plan and applicable requirements of this SOP.

4.4 Responsible BG Health & Safety Manager (RHSM)

The Responsible Health & Safety Manager is the HSM assigned by the Business Group H&S Lead to provide health and safety technical guidance and support to the project. The RHSM prepares and/or approves the CH2M HILL project H&S plan, develops the Cr VI sampling plan, conducts the personal protective equipment (PPE) evaluation for skin, eye, and respiratory hazards to Cr VI, reviews subcontractor H&S plans and submittals, conducts project H&S audits, and provides H&S support and guidance to the project.

4.5 Site Safety Coordinator (SSC)

The Site Safety Coordinator is either the Site Manager or is someone designated by the Site Manager to implement the project H&S plan. The Site Safety Coordinator ensures that the appropriate elements of this SOP are implemented.

5.0 Requirements

The following requirements outline the mandatory criteria that each CH2M HILL Legal Entity must comply with when implementing this SOP using their policies, procedures, processes, training, and contracting documents.

5.1 Subcontractor Management

Subcontractor H&S responsibilities are expressly defined through the subcontract terms and conditions. Subcontractors must determine how to conduct their operations, in compliance with applicable H&S regulations and industry standards, and how to correct deficiencies. CH2M HILL employees shall not direct the means and methods of subcontractor operations.

Subcontractors are responsible and accountable for implementing these requirements and any additional requirements established in their own health and safety procedures as described in CH2M HILL [HSE SOP 201](#), [Contracts](#), [Subcontracts](#), and HSE Practices. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of H&S requirements.

The "Subcontractor Health and Safety Procedure Criteria – Cr VI" presented in Attachment 1 provides the minimum criteria for these safety procedures. These criteria may be used by the H&S staff to review submitted subcontractor safety procedures when CH2M HILL is performing oversight of subcontractor's operations.

The "HS&E Self-Assessment Checklist – Cr VI" in Attachment 2 may be used to verify subcontractor's compliance with established safe work practices, regulations, and industry standards.

5.2 Exposure Determination

- Initial exposure monitoring must be conducted to document worker breathing-zone exposures over the course of a full shift. A representative 8-hour TWA sample shall be collected to determine employee exposure for each job classification in each work area.
- Exposure determinations must follow the current, accepted sampling and analytical method equivalent to that used by OSHA.
- Sample media used for Cr VI monitoring will be analyzed using an industrial hygiene laboratory accredited by the American Industrial Hygiene Association (AIHA). An equivalent laboratory accreditation can be substituted in countries that do not have an AIHA-accredited industrial hygiene laboratory.
- Periodic monitoring of workers is required at least every 6 months when the initial monitoring indicates TWA results are equal to or greater than the Action Level (AL) but below the Permissible Exposure Limit (PEL).
- When initial monitoring results are greater than the PEL, additional periodic monitoring, at least quarterly, for each worker involved is required.
- Periodic monitoring every 6 months or quarterly may be halted when two consecutive samples taken at least 7 days apart are equal to or below the AL.
- When monitoring results fall below the AL, monitoring may be suspended.
- Additional monitoring is required when there has been a change in production process, control equipment, personnel, or work practices that may result in new or additional exposures.
- A performance-oriented option may be used to determine the initial 8-hour TWA exposure for each worker on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize exposure to Cr VI.
- Workers shall be informed in writing of exposure monitoring results within 5 working days after receipt of the results.
- When the PEL has been exceeded, notification to the affected worker shall include the control measures utilized to reduce the exposure to below the PEL.

5.3 Demarcation of Regulated Areas

Work areas where worker exposure to Cr VI is or can reasonably be expected to exceed the OSHA PEL must be demarcated and access limited to only workers authorized to enter.

5.4 Methods of Compliance

Engineering and work practice controls must be applied to reduce the Cr VI worker exposure level to below the OSHA PEL unless it can be demonstrated that such controls are not feasible. Rotating employees to different jobs shall not be used to achieve compliance with the PEL. Methods of compliance in the hierarchy of controls include the following:

- Substitution – gas tungsten arc welding (GTAW) instead of shielded metal arc welding (SMAW) or flux cored arc welding (FCAW)
- Engineering controls – mechanical ventilation to remove fumes from the breathing zone
- Administrative controls – safe work practices for the worker on proper positioning to minimize fume trail in their breathing zone, either through positioning upwind in an open area or in proper alignment with ventilation controls
- Personal protective equipment (PPE) – use of respiratory protection as the last resort in reducing exposure or as an interim measure until substitution can be applied or engineering controls installed

5.5 Respiratory Protection

Respiratory protection will be provided by the employer and worn by the worker sufficient to reduce the exposure to below the Cr VI action level. Respiratory protection will be used only as a last resort to ensure that worker exposure to Cr VI is maintained below the action level, or as an interim measure while applying substitution of materials or processes, implementation of work practice controls, or installation of mechanical ventilation. When employee exposures are above the PEL for no more than 30 days per year (12 consecutive months) from a particular process or task, respiratory protection can be primarily relied upon to ensure employee exposure is maintained below the PEL.

The elements of the respiratory protection program must comply with the CH2M HILL [HSE SOP 121, Respiratory Protection](#), and 29 CFR 1910.134, Respiratory Protection. Key elements for an appropriate respiratory protection program include the following:

- Exposure assessment to determine the appropriate respiratory protection to be selected with the required protection factor and fit factor
- Medical surveillance for workers to determine their ability to wear respiratory protection
- Fit testing of workers to identify which model and type of respiratory protection can be worn
- Training workers on the how to wear, use, clean, and maintain their respiratory protection equipment
- Respirator cartridge change-out guidelines for workers
- Periodic evaluation of the respiratory protection program by the assigned H&S representative.

5.6 Personal Protective Equipment (PPE) and Work Clothing

Personal protective equipment and work clothing shall be provided to workers where an eye or skin hazard may exist to Cr VI. The elements of the PPE and work clothing program must comply with the CH2M HILL [HSE SOP 117, Personal Protective Equipment](#), and 29 CFR 1910.132, General Requirements for Personal Protective Equipment, and 29 CFR 1910.133, Eye and Face Protection. Key elements for an appropriate protective work clothing program include the following:

- Evaluation by the RHSM of work tasks to identify the appropriate type of PPE and work clothing
- Providing the appropriate PPE and work clothing in a variety of sizes and styles
- Training workers on wearing, using, cleaning, and maintaining PPE and work clothing
- Ensuring that workers do not remove contaminated PPE or work clothing from the worksite
- Providing a service to launder reusable work clothing

5.7 Hygiene Areas and Practices

Where work clothing is required to be worn in place of street clothing to prevent skin exposure to Cr VI, change rooms and washing facilities must be provided. Change rooms must include separate storage facilities for work clothing and for street clothes. Washing facilities must be readily accessible to workers and must be used by them at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

An area on the worksite must be designated to be free of Cr VI for workers to consume food or beverages.

5.8 General Work Practices and Housekeeping

Work areas or project sites where Cr VI can potentially expose workers must implement and follow work practices to maintain acceptable housekeeping conditions to minimize contact or exposure. General work practices and housekeeping must include the following:

- All surfaces must be maintained as clean as practicable to minimize accumulation of Cr VI containing substances, dust, or particles.
- All spills and releases of Cr VI containing material must be cleaned up promptly.
- Surfaces contaminated with Cr VI must be cleaned with HEPA-filter vacuuming or equivalent methods or practices that minimize the potential for worker exposure.
- Avoid using compressed-air, dry-shoveling, dry sweeping, or dry brushing, and use only when a HEPA-filter vacuum system or equivalent method has been tried and found to be not effective.
- Collection of waste, scrap, debris, or other materials contaminated or containing Cr VI must be in impermeable containers or bags and labeled meeting hazard communication requirements described in CH2M HILL [HSE SOP -107, Hazard Communication](#), or 29 CFR 1910.1200, Hazard Communication.
- Waste containing significant amounts of chromium may be subject to hazardous waste regulations and the corresponding generation, treatment and disposal requirements. Refer to the Standard Operating Procedure [HSE-413 -Waste Management Planning](#) and/or contact the appropriate CH2M HILL BG or project Environmental Manager (EM) for information on how to determine whether the waste is considered hazardous waste.

5.9 Medical Surveillance

Workers who are or will be potentially exposed to airborne Cr VI above the action level for at least 30 days per year, without regard to respirator use, will participate in their employer's Cr VI medical surveillance program.

Further participation in periodic Cr VI medical surveillance will be based on exposure conditions (such as an emergency or when a worker shows signs or symptoms of exposure), annually, or within a specified frequency determined by the company consulting physician (or equivalent), and at termination of employment

Subcontractors are responsible for their workers receiving medical surveillance for Cr VI as required by regulatory requirements, contract, or their own company's requirements.

5.10 Communication of Hazards

Information concerning Cr VI hazards will be communicated according to the requirements of the OSHA Hazard Communications Standard and the OSHA Cr VI Standard including, but not limited to, the requirements concerning warning signs and labels, material safety data sheets (MSDSs), and employee information and training.

The entrance to regulated areas must be posted with signs that read "CHROMIUM VI REGULATED AREA - AUTHORIZED PERSONNEL ONLY".

In addition to the posting requirements, owners, contractors, and other personnel working in the area must be notified.

All storage or shipping containers shall be labeled with the following "Danger - Contains Cr VI - Cancer Hazard - Harmful if Inhaled or Swallowed - Use Only with Adequate Ventilation or Respiratory Protection".

A copy of this SOP and the OSHA Cr VI Standards (General Industry and Construction) will be made available to all affected project workers.

A Cr VI Fact Sheet in Attachment 3 provides basic awareness level information. This information is not intended to replace or fulfill the requirements for maintaining Cr VI MSDSs.

Additional communication requirements are described in Section 6.0 Training Requirements.

6.0 Training Requirements

Workers who may be exposed to airborne Cr VI above the action level or anticipate working on projects where they could be exposed to airborne Cr VI above the action level, or to soil that contains elevated levels of Cr VI, must complete initial Cr VI exposure training. This training covers the following information:

- Where Cr VI is typically encountered at CH2M HILL projects
- The regulatory requirements, exposure limits, potential hazards including toxicity and physical characteristics, and medical monitoring requirements

- For site-specific Cr VI hazards, discussion on the location and tasks associated with potential exposure and associated control measures
- Information contained in the Cr VI Fact Sheet (Attachment 3) and the site-specific Health, Safety, and Environmental Protection Plan or Field Safety Instruction created for the project
- Quantity, location, manner of use, storage, sources of exposure, and the specific nature of operations that could result in exposure to Cr VI, as well as any necessary protective steps
- Purpose, proper use, and limitation of respirators
- Purpose and a description of the medical surveillance program
- Engineering controls and work practices associated with the employee's job assignment
- A review of this SOP

Each worker must be provided with a copy of the OSHA Chromium Standard (General Industry and/or Construction) and appendices if requested.

Subcontractors are responsible for complying with all applicable HSE training requirements relating to Cr VI exposure and for providing the training necessary to complete their tasks safely.

Some states' OSHA plans (such as Washington, Oregon, and California) have more stringent requirements for training providers and for certification of workers. Contact the BG H&S Lead or Regional HSM for additional information.

7.0 Assessment Requirements

The "HS&E Self-Assessment Checklist—Hexavalent Chromium" in Attachment 2 is provided as a method for verifying compliance with this SOP. The RHSM may use this checklist when performing H&S audits at CH2M HILL projects, including subcontractor's activities.

8.0 Recordkeeping

An accurate record of all worker personal air sampling and other air monitoring related to determining Cr VI exposure for CH2M HILL employees must be completed and maintained that includes the following:

- Industrial hygiene sampling surveys
- Specific information on the sample date, worker(s) sampled with their employee number outside of the US, job classification, process or task sampled, materials used, PPE worn, sample duration, air sampling, and analytical method

For historical monitoring data, an accurate record of the determination must include the following information:

- Confirmation that the data was collected using acceptable sampling and analytical methods
- Description of the process that matches the task, conditions, materials, equipment, and process for which the exposure is being determined

For objective data, an accurate record of information that is relied upon to determine worker exposure must include the following information:

- The type of chromium-containing material
- Description of the process, activity or operation
- Other relevant information used to support a comparable exposure assessment

Exposure assessment records related to Cr VI, including worker personal air sampling, historical monitoring data, and objective data must be maintained for a minimum of thirty (30) years. Copies of exposure assessment records for CH2M HILL employees are to be forwarded to the Enterprise HS Recordkeeping Administrator or placed in the Enterprise HS Recordkeeping database by the BG HS Lead or designee.

Medical monitoring records related to Cr VI must be maintained for each employee for thirty (30) years beyond their duration of employment. Medical monitoring records will be retained in the employee's medical file and maintained by the CH2M HILL occupational health care provider.

9.0 Attachments

Attachment 1: [Subcontractor Health and Safety Procedure Criteria - Cr VI](#)

Attachment 2 [Self-Assessment Checklist - Cr VI](#)

Attachment 3: [Cr VI Fact Sheet](#)

10.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1		Updated to Standard Operating Procedure		<i>R. Keith Christoph</i>
2	11/16/2006	The last bullet in Section 5.8 was added to address hazardous waste determination.	Jeff Stumpf; Jim Kelly	<i>R. Keith Christoph</i>



Attachment 1: Subcontractor Health and Safety (H&S) Procedure Criteria – Cr VI

The following criteria are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of subcontractor Cr VI procedures. Subcontractors are expected to address the following items in their H&S procedures.

Minimum Acceptable Criteria for Subcontractor Cr VI Operation Procedures:

1. Provide the exposure assessment and training records for workers involved in operations where there is a potential or known exposure to Cr VI above the action level.
2. Provide medical surveillance approvals for workers required to wear negative-pressure respirators.
3. Provide a sampling plan and information pertaining to the development of an exposure assessment. The information should include the basis of sampling for compliance with the Cr VI Standard.
4. Provide background information when a performance-oriented option is used to determine the 8-hour TWA exposure for each worker on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize exposure to Cr VI.
5. Provide a copy of the written respiratory protection program when respirators are anticipated to be used to control exposure to Cr VI.
6. Describe work activities and locations where Cr VI is present or will be introduced into the project work environment.
7. Describe control methods utilized to minimize exposure to Cr VI.
8. Describe housekeeping and maintenance plans to be used to document the frequency of housekeeping operations and cleaning and maintenance of dust collection systems (if use is anticipated).
9. Provide a copy of the written program to reduce worker exposure to or below the PEL including a schedule of development and implementation of the engineering and work practice controls. Also, the program shall identify operation equipment, materials, existing controls, crew size, operating procedures, and maintenance practices (if you anticipate the PEL will be exceeded). If it is expected the PEL for Cr VI will not be exceeded during subcontractor operations, a plan is not required. However, if the PEL is exceeded and a regulated area must be established, then the subcontractor must stop work until this written program has been developed and reviewed.



Attachment 2: Self-Assessment Checklist – Cr VI



HS&E Self-Assessment Checklist – Cr VI

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at the following locations: (1) where CH2M HILL workers are exposed to Cr VI, or (2) where CH2M HILL provides oversight of subcontractor workers who are exposed to Cr VI.

The Site Safety Coordinator (SSC) may consult with subcontractors when completing this checklist, but shall not direct the means and methods of Cr VI operations nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed workers shall be removed from the hazard until corrected.

Completed checklists shall be sent to the project H&S Manager for review.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

- ☐ Evaluate CH2M HILL worker exposure to Cr VI hazards
 - ☐ Evaluate a CH2M HILL subcontractor's compliance with the Cr VI standard and its requirements
- Subcontractor's Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1

PERSONNEL SAFE WORK PRACTICES	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
1. Areas that exceed the PEL have been designated as regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Personnel meet medical and training requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. No eating, drinking, smoking, chewing tobacco/gum, or cosmetics are allowed in the regulated areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Warning signs have been posted at all entrances to the regulated areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Selection of PPE is based on most relevant exposure monitoring data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Personnel working near Cr VI-contaminated soil or material must use HEPA-filter vacuuming and work practices to control dust; wear disposable coveralls and exercise personal hygiene practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



HS&E Self-Assessment Checklist – Cr VI

	<u>SECTION 2</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
EXPOSURE ASSESSMENTS					
7. Initial air monitoring conducted over full shift for each job classification.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Air sampling conducted every six months when exposure limit (EL) \geq AL but $<$ PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Air sampling of employees conducted quarterly when EL \geq PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Additional air monitoring has been collected when there are any changes in operation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COMMUNICATION OF HAZARDS					
11. Training on the Hazard Communication Standard has been met.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. CH2M HILL workers have completed the Cr VI Training Module.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Training on the Fact Sheet, HSP/FSI, and OSHA standard has been met.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Affected workers have been informed of air monitoring results within 5 days after receipt of results.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Where PEL is exceeded, affected workers have been notified of results and control measures to be utilized to reduce exposure below the PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Storage or shipping containers have been properly labeled		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Written compliance program is available to all affected workers		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>N/O</u>
CONTROL METHODS					
18. Substitution, engineering controls, and/or work practices have been utilized to reduce exposures below the PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. When controls are unable to reduce exposures below the PEL, respiratory protection is utilized.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Regulated areas have been established and demarcated where exposures exceed the PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Only authorized workers with respiratory protection may enter regulated areas.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Surfaces are kept free of Cr VI accumulation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Cleaning methods minimize airborne Cr VI exposure/accumulation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Where HEPA-filter vacuuming is used, vacuums are used and emptied as to minimize airborne Cr VI.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. A written housekeeping and maintenance plan is in place and maintained.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Compressed air not used to remove Cr VI from surfaces.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Workers do not eat, drink, smoke, chew tobacco/gum, or apply cosmetics in regulated areas.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Change areas provided where EL \geq PEL or where employees are subject to eye or skin irritation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Employees not allowed to leave workplace wearing clothing worn during work shift.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Shower facilities installed and used with cleaning agents and towels, where feasible.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Hand washing facilities provided for use by employees prior to eating, drinking, smoking, etc.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Eating facilities free of Cr VI provided for employees working in regulated areas.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERSONAL PROTECTIVE EQUIPMENT (3.2.5)					
33. Respirators are used in areas where EL \geq PEL.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Respirator cartridges are replaced at the end of shift or as determined by HSM.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. The selection of the appropriate respirator is based on the airborne Cr VI concentration.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. PAPRs are provided to employees who request such a respirator.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. PPE is supplied at no cost to employees.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Protective clothing is repaired or replaced if found to be ineffective.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Contaminated protective clothing is removed from change areas at the end of the shift.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. All clothing requiring laundering is packaged in sealed, labeled containers.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Personnel or vendors who launder contaminated clothing are formally informed of the hazards.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Complete this section for all items checked “No” in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Auditor: _____ Project Manager: _____

Attachment 3:-Fact Sheet – Cr VI

Uses and Occurrences

Chromium is a naturally occurring element in rocks, animals, plants, soil, and volcanic gases. Chromium occurs in the environment predominantly in one of two valence states:

- Trivalent (Cr III), which occurs naturally and is an essential nutrient, and
- Hexavalent chromium (Cr VI), which, along with the less common metallic chromium (Cr 0), is most commonly produced in plating processes

The major industrial sources of Cr VI compounds are chromate pigments in dyes, paints, inks, and plastics; chromates added as anti-corrosive agents to paints, primer, and other surface coatings; chrome plating by depositing chromium metal onto an item's surface using a solution of chromic acid; particles released during smelting of ferro-chromium ore; fumes from welding stainless steel or nonferrous chromium alloys; and as an impurity in Portland cement.

Physical Characteristics

Appearance:	Dark red flakes or powder
Odor:	None
Flammable:	Non-combustible solid, but will accelerate the burning of combustible materials
Flash Point:	None
Flammable Range:	None
Specific gravity:	2.7 for Cr VI
Stability:	Stable
Incompatibilities:	Reducing and oxidizing agents, acetic acid
Melting Point:	1907°C or 3465°F for Cr
Boiling Point:	2671°C or 4840°F for Cr

Signs and Symptoms of Exposure

- Short term (Acute): Coughing,, sneezing, chest pain, breathing difficulty, itching and burning sensation to skin and lungs.
- Long term (Chronic): Allergic (asthma like symptoms) respiratory reaction, skin and eye irritation, nosebleeds, contact dermatitis, allergic like skin reaction, ulceration and perforation of the nasal septum

Modes of Exposure

Inhalation:	Dusts and fumes
Skin Absorption:	Liquid
Ingestion:	Dusts and liquid

Exposure Limits

Action level	2.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$)
PEL	5 $\mu\text{g}/\text{m}^3$
STEL	None
TLV	5 $\mu\text{g}/\text{m}^3$

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
AL > EL, EL < PEL	Implement portions of the OSHA Cr VI standard and Training
EL > PEL	Implement all portions of the OSHA Cr VI Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye:	Safety glasses;
Skin:	Chemical protective gloves and body protection
Respiratory:	Air-purifying respirators and supplied-air respirators, depending on the exposure, and a PAPR if requested by the worker

First Aid

Inhalation:	Move to fresh air; seek medical attention promptly
Skin:	Quick drenching with water; wash skin with soap and water; seek medical attention promptly
Eyes	Flush with water for 15 minutes, lifting the lower and upper lids occasionally; seek medical attention promptly
Ingestion:	Seek medical attention promptly



Explosives Usage and Munitions Response (MR) Enterprise Standard Operating Procedure HSE -610

1.0 Applicability and Scope

1.1 Applicability

This Standard Operating Procedure (SOP) applies to:

- (1) CH2M HILL employees who enter areas known or suspected of having munitions,
- (2) Areas where explosives are used for construction or demolition purposes, and
- (3) Managers who may be responsible for oversight of a subcontractor's explosives usage, MR operations, or Controlled Detonation Chamber (CDC) operations.

Explosives usage or MR operations may be conducted on active, inactive, closed, transferring, or transferred ranges; former battlefields; disposal sites; munitions manufacturing and storage sites; and construction sites.

1.2 Scope

This SOP provides information regarding the spectrum of hazards and issues to be addressed during each phase of a project associated with operations involving the use of explosives. Hazardous situations addressed in this SOP include exposure to explosives used for construction or demolition work; munitions and explosives of concern (MEC), which include unexploded ordnance (UXO), discarded military munitions (DMM), and material potentially presenting an explosive hazard (MPPEH); chemical warfare materiel (CWM), or munitions constituents (MC) contaminated soil and groundwater; munitions demilitarization operations; Controlled Detonation Chamber (CDC) operations; and operations to locate, identify, remove, and dispose of munitions.

CH2M HILL employees who enter areas where explosives may be encountered or used must take precautions to avoid these hazards and be aware of associated safe work practices.

As described in SOP [HSE-215, Contracts, Subcontracts, & HSE Management Practices](#), responsibilities for health, safety, and environmental (HS&E) protection are expressly defined through subcontract terms and conditions. CH2M HILL's HS&E practices in the field are determined on the basis of these defined responsibilities. Consistent with HSE -215, the subcontractor must determine how to operate safely, comply with applicable HS&E regulations and industry standards, and correct any deficiencies.

1.3 Regulatory Review

Projects involving the use of explosives are often complex (may require the acquisition, receipt, storage, and use of explosives to include insurance, permits/license, public safety, etc.) and have a myriad of regulatory requirements to ensure safety. A brief description of the major requirements follows:

U.S. Department of Defense (DOD) Ammunition and Explosives Safety Standards, DOD 6055.9-STD, establishes uniform safety standards that apply to ammunition and explosives, to associated personnel and property, and to unrelated personnel and property exposed to the potential damaging effects of an accident involving ammunition and explosives during their development, manufacturing, testing, transportation, handling, storage, maintenance, demilitarization, and disposal. Additional regulatory requirements are: Title 18 U. S. Code, 842, Safe Explosives Act, 27 CFR Part 555.1 Explosives, 29 CFR 1910.109 Explosives and Blasting Agents, National Fire Protection Association 495 Explosive Materials Code, 49 CFR Parts 100–199, Hazardous Materials Transportation.

The U.S. Environmental Protection Agency (EPA) regulates the disposal of military munitions, and of waste that contains military munitions, through the Military Munitions Rule (MMR) (62 Federal Register [Fed. Reg.] 6621, February 12, 1997; 40 Code of Federal Regulations [CFR] Part 260 et seq.) under authority of the Resource Conservation and Recovery Act (RCRA). The rule has two functions: (1) it identifies when conventional and chemical military munitions become a solid waste, and (2) it provides criteria for storing and transporting such waste, including a conditional exemption if the munitions are managed under DOD rules.

This SOP incorporates by reference the guidelines and requirements for MR operations that are published by the U.S. Army Corps of Engineers (USACE) Engineering Support Center, Huntsville, Alabama. These are accepted industry standards, similar to voluntary consensus standards published by such organizations as the National Fire Protection Association (NFPA) and the American National Standards Institute (ANSI).

2.0 Project Planning

2.1 Planning Requirements

Compliance with the applicable governing laws and regulations is the responsibility of the Project Manager. The Project Manager will contact the MR Operations Manager, or in his absence the MR Safety/Quality Officer or the Munitions Response Market Segment Director, prior to and post MR (paragraph 17) of the ORE approval and subsequent GO/NO GO decision for determination of applicable governing laws and regulations and to assist with planning and executing support for such activities as blasting operations, hazardous toxic radiological waste (HTRW) support, construction support, MR actions, handling of CWM or explosive-contaminated soils, and munitions demilitarization. The following types of support may be needed for MR operations:

- For on-site visits with known or suspected MEC, an Abbreviated Accident Prevention Plan (AAPP) (See **Attachment 1**) must be prepared. This AAPP is to be used only for non-intrusive site visits, and it must be approved by the MR Safety/Quality Officer, or

in his absence either the MR Operations Manager or MR Market Segment Director, before the field visit starts. All team members must read and comply with the AAPP and attend the safety briefings. The UXO Safety Officer (UXOSO) shall ensure that the Safety Briefing Checklist and the Plan Acceptance forms are filled out before the site visit begins.

- On an HTRW site with known or suspected MEC, MEC support involves implementing anomaly avoidance techniques to avoid any potential surface MEC and any subsurface anomalies. A Site Safety & Health Plan (SSHP) must be prepared. This SSHP is to be used only for non-intrusive anomaly avoidance activities, and it must be approved by the MR Safety/Quality Officer, or in his absence the MR Operations Manager or the MR Market Segment Director prior to the start of fieldwork. All team members must read and comply with the SSHP and attend the safety briefings. The UXOSO shall ensure that the Safety Briefing Checklist and Plan Acceptance Form are filled out prior to the start of the site work.
- On a construction site with known or suspected MEC, support must be provided by qualified UXO personnel during construction activities. The level of MEC support required depends on the probability of encountering MEC, determined on a project-by-project basis. This will be identified during the MR (paragraph 17) of the ORE.
- MR actions in which the intent is to locate, identify, excavate, remove, and dispose of MEC may require a Senior UXO Supervisor, UXO Safety Officer, and UXO Quality Control Specialist, to oversee UXO contractor teams performing operations.
- On an MR site that has MC contamination of soil or groundwater, MEC support may include both anomaly avoidance techniques and MEC construction support for excavating and/or treating MC-contaminated soil and groundwater.
- On munitions demilitarization projects, MEC support is required to identify, handle, disassemble, process, certify, transport, and treat or dispose of munitions components.
- On projects where explosives waste is transported or disposed of offsite, the MR Operations Manager and the BG Environmental Compliance Coordinator (ECC) may assist in identifying the applicable regulations and permits required.
- On projects where munitions debris (MD), material potentially presenting an explosive hazard (MPPEH), or inert munitions is recovered and processed for disposal as scrap, the MR Operations Manager and the BG ECC may determine whether treatment and certification is required, along with any permitting requirements.
- For drilling activities at project sites suspected of MEC contamination, the UXO team shall conduct a reconnaissance and MEC avoidance to provide clear access routes to each site before drilling crews enter the area. Down hole avoidance support shall be conducted at intervals every one foot until the depth that was determined during the MR ORE was reached. The procedures listed in [HSE-204, Drilling](#), apply and shall be implemented.
- For excavation activities at project sites suspected of MEC contamination, the UXO team shall conduct a reconnaissance and MEC avoidance to provide clear access routes to

each site before excavation crews enter the area. The procedures listed in [HSE-307, Excavations](#), apply and shall be implemented.

- Safety and quality control (QC) audits shall be included in developing cost estimates for any MR or explosives usage project that will last more than two weeks.
- On projects that include intrusive activities to investigate MEC or use of explosives (blasting), an Explosive Safety Submission (ESS), an Explosive Siting Plan (ESP), and an Explosive Management Plan (EMP) may be required. The MR Operations Manager, or in his absence the MR Safety/Quality Officer or MR Market Segment Director, shall assist in evaluating project requirements and coordinate with others as appropriate.

The project UXOQCS or in his/her absence, one the following, MR Program Quality Manager, MR Safety/Quality Officer or the MR Market Segment Director, shall verify subcontractor training, personnel qualifications, and current medical examinations prior to the start of field operations. Any identified shortfalls in qualifications should be reported to the MR Operations Manager or in his absence to the MR Safety/Quality Officer or the Market Segment Director for resolution.

2.2 Opportunity and Risk Evaluation (ORE)

Every project or task involving the usage of explosives or a Munitions Response (MR) requires completion of the Munitions Response ORE form in **Attachment 2**. The most current form and assistance in filling out the form can be obtained from the MR Safety/Quality Officer, MR Operations Manager, or MR Market Segment Director. This document is a living form and should be updated as a project is developed and executed or upon change of scope of work (SOW), identification of previously unknown hazards, etc. Final acceptance of the MR ORE is done by the MR Safety/Quality Officer. Upon acceptance of the MR ORE, the Project Delivery Team (PDT) is required to perform the Go/No Go decisions making process per the ESBG Authority Matrix.

2.3 Alcohol, Tobacco, Firearms, and Explosives (ATF&E) Background Investigation

The "Safe Explosives Act of 2002" requires the employer (CH2M HILL) to submit to ATF&E identifying information, fingerprints, and photographs for all "Responsible Persons" and "Possessors of Explosives."

All personnel designated as Responsible Persons or Possessors of Explosives involved in explosives usage and MR projects must provide a 2-inch by 2-inch color picture and an ATF Form 5400.28 filled out for submission by the ATF&E License Holder (contact MR Operations for assistance) who will forward them to ATF&E so that a background investigation can be conducted to establish eligibility to work with explosives.

Under the "Safe Explosives Act," a "Responsible Person" and a "Possessor of Explosives" are defined as follows:

Responsible Person: An individual who has the power to direct the management and policies of the applicant pertaining to explosive materials. Generally the term includes partners, sole proprietors, project managers, site managers, corporate officers and directors, and majority shareholders.

Possessor of Explosives: An individual who has actual physical possession or constructive possession, which means the person has dominion or control over explosives. For example, persons who are physically handling explosive materials would be considered to be possessors of explosives. This would include employees who handle explosive materials in order to ship, transport, or sell them; and employees, such as blasters, who actually use explosive materials. Other examples of possessors include a supervisor at a construction site who keeps keys for magazines in which explosives are stored, or who directs the use of explosive materials by other employees; and an employee of a licensee or permittee transporting explosive materials from a licensed distributor to a purchaser.

Assistance in filling out required forms can be obtained from the MR Operations Manager, or in his absence the MR Safety Officer or the MR Market Segment Director. Submission of completed forms to ATF&E is the responsibility of the ATF&E License Holder. Upon submission of the required forms “responsible persons and possessors of explosives” may execute their duties pending completion of the background investigation.

ATF&E will notify employers in writing of the result of each background check and will supply the “responsible person” or “possessor of explosives” with a “Letter of Clearance” where appropriate. The custodian of the ATF&E records will request a copy of this certificate from the employee.

2.4 Training Requirements

2.4.1 MR Projects

CH2M HILL employees and subcontractors who work on projects that involve MR must complete the following training:

- A one-time, 40-hour Hazardous Waste Operations and Emergency Response course, and a minimum of three days’ actual field experience under the direct supervision of a trained supervisor as specified in 29 CFR §1910.120(e).
- An annual 8-hour hazardous waste refresher course, as specified in 29 CFR §1910.120(e) (8).
- Hazardous waste supervisory training (required for managers and supervisors only) as specified in 29 CFR §1910.120(e)(4).

All UXO technicians must be graduates of one of the following:

- U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD;
- U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD;
- U.S. Naval EOD School, Eglin Air Force Base (AFB), FL;
- EOD Assistants Course, Redstone Arsenal, AL;
- EOD Assistant Course, Eglin AFB; or
- An equivalent course as identified in Department of Defense Explosives Safety Board (DDESB) Technical Publication (TP) 18

The project UXOQCS or in his/her absence the MR Operations Manager, MR Safety/Quality Officer or the MR Market Segment Director, must review and accept subcontractor personnel qualifications.

2.4.2 Commercial Blaster Requirements

Commercial blasting is most often done in support of construction projects to remove or reduce obstacles that interfere with the construction of new roads, bridges, tunnels, harbors, or other facilities.

In order to be qualified as a "Blaster," the individual shall be able to understand and give written and oral orders; be in good physical condition and not be addicted to narcotics, intoxicants, or similar types of drugs; and be qualified by reason of training, knowledge, or experience in the field of transporting, storing, handling, and use of explosives, and have a working knowledge of state and local laws and regulations that pertain to explosives. A "Blaster" will be required to furnish satisfactory evidence of competency in handling explosives and performing in a safe manner the type of blasting that will be required. A Blaster must also be knowledgeable and competent in the use of each type of blasting method used.

Depending on the type and location of work performed, personnel that transport explosives may need to have a commercial driver's license (CDL) with a hazardous material endorsement in accordance with Department of Transportation Requirements specified in 49 CFR.

The following definitions provide an overview the types of explosives which may be used in commercial blasting:

Explosives -- any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified by the U.S. Department of Transportation; see 49 CFR Chapter I. The term "explosives" shall include all material which is classified as Class A, Class B, and Class C explosives by the U.S. Department of Transportation, and includes, but is not limited to dynamite, black powder, pellet powders, initiating explosives, blasting caps, electric blasting caps, safety fuse, fuse lighters, fuse igniters, squibs, cordeau detonant fuse, instantaneous fuse, igniter cord, igniters, small arms ammunition, small arms ammunition primers, smokeless propellant, cartridges for propellant-actuated power devices, and cartridges for industrial guns. Commercial explosives are those explosives which are intended to be used in commercial or industrial operations.

(i) **Class A explosives.** Possessing, detonating, or otherwise having maximum hazard, such as dynamite, nitroglycerin, picric acid, lead azide, fulminate of mercury, black powder, blasting caps, and detonating primers.

(ii) **Class B explosives.** Possessing flammable hazard, such as propellant explosives (including some smokeless propellants), photographic flash powders, and some special fireworks.

(iii) **Class C explosives.** Includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities.

2.5 Medical Surveillance Requirements

All CH2M HILL employees who perform field work on MR sites must participate in a medical monitoring program in accordance with 29 CFR 1910.120 and [HSE-113, Medical Monitoring](#).

Employees who terminate employment and who have performed field work at MR project sites may be required to undergo an exit examination.

Subcontractors are responsible for ensuring that their employees are enrolled in a medical surveillance or monitoring program that meets the requirements of 29 CFR 1910.120.

2.6 Drug Free Workplace Requirements

CH2M HILL employees who perform or oversee MR operations are subject to the provisions of [HSE-105, Drug-Free Workplace](#).

All CH2M HILL employees assigned to MR projects are subject to the provisions of HSE-105, Drug-Free Workplace. Subcontractors are responsible for ensuring that their employees who perform MR operations on CH2M HILL projects are on a drug abuse surveillance program that meets the requirements of HSE-105.

2.7 Competent Person Requirements

2.7.1 Munitions Response

A competent person may be a Senior UXO Supervisor, UXO Safety Officer, UXO Quality Control Specialist, or UXO Technician III. The competent person must meet the following minimum qualifications:

- Be a graduate of one of the schools and courses listed for all UXO technicians in Section 2.4.1 above and meet the requirements of DDESB TP-18,
- Have at least 8 years of combined active-duty military EOD experience and contractor UXO experience, and
- Have experience in MR operations and supervision of personnel.

The MR Operations Manager, the MR Market Segment Director, and the MR Safety/Quality Officer will compose the Ammunition & Explosive Personnel Qualification and Certification Board for employees of CH2M HILL. This Board will review individual qualifications and experiences for determining who will be allowed to perform those duties and assignments associated with SUXOS, UXOQC, UXOSO, and CDC Chamber Operator. Project managers are required to notify in writing, the MR Safety/Quality Officer of any CH2M HILL UXO Technician assignments requiring service related documented of qualifications.

2.7.2 Blasting

Blasting subcontractors are responsible for providing a competent person to oversee blasting operations. A competent person may be a state licensed blaster. The competent person must be qualified through a license or permit issued by a state or local jurisdiction based on testing, extensive knowledge, training, and experience with an ability to solve or resolve problems related to blasting, and must meet the following requirements:

- Able to understand and give written and oral orders.
- In good physical condition and not be addicted to narcotics, intoxicants, or similar types of drugs.
- Required to furnish satisfactory evidence of competency in handling explosives and performing in a safe manner the type of blasting that will be required.
- Knowledgeable and competent in the use of each type of blasting method used.

2.8 Safety Equipment

Subcontractors are responsible for providing all necessary personal protective equipment (PPE) for their employees. CH2M HILL will provide PPE only for its own employees. Other safety equipment will be provided as delineated in the subcontract and documents referenced by the subcontract. The MR Safety Officer, or in his absence the MR Operations Manager or the MR Market Segment Director, must review subcontractor work plans and site-specific HS&E plans to ensure that appropriate safety equipment has been included to meet the requirements of the scope of work (SOW).

Personnel who will be handling explosives will not wear outer or inner garments having static electricity-generating characteristics. These include clothing made of 100 percent polyester, nylon, silk, and wool, which are all highly static producing.

Protective shoes worn by personnel performing explosives operations should be constructed of nonferrous materials (e.g., fiberglass) to prevent interference with sensitive geophysical instruments.

UXO Technicians are required to wear hard hats when an overhead hazard exists or when specified in the site-specific HS&E plan. Hard hats should *not* be worn, however, when investigating suspect MEC. A hard hat can create an unsafe condition by falling off the technician's head at a critical moment. Also, if a MEC is accidentally detonated (the worst-case accident scenario), the hard hat will not protect the technician from fragments and may worsen the injury by reflecting fragments into the head of the technician. This is consistent with safety guidance from the Corps of Engineers, Huntsville Center, Military Munitions Center of Expertise (MM-CX).

2.9 Subcontractor Selection

Subcontractors are selected based on their past performance in working for CH2M HILL, safety record, experience, and compliance with federal, state, and local jurisdiction licensing and permitting.

Additional criteria may be developed, depending upon the specific SOW requirements for the subcontractor. When oversight is required by HSE-215, the CH2M HILL MR Safety/Quality Officer, or in his absence the MR Operations Manager or MR Market Segment Director, shall use these developed criteria to review the explosives procedures submitted by the subcontractor.

3.0 Definitions

Please see **Attachment 3** for definitions.

4.0 Project Execution

4.1 Safe Work Practices

Management is responsible to control and eliminate unsafe work conditions through training and engineering out the hazard. The requirements of this section are to be followed by all personnel where explosives are used, regardless of the company performing the operations. These requirements also pertain to subcontractor personnel.

4.2 MR Operations

On MR project sites, the MR Operations Manager will be contacted to establish requirements.

4.3 Regulations and Industry Standards

As described in HSE-215, the MR Safety Officer/Quality or UXOQCS may be required to oversee a subcontractor's field activities. Subcontractors retain control over their practices, and CH2M HILL's oversight does not relieve them of their own responsibility for effective implementation and enforcement of HS&E requirements. The following subsections provide the minimum regulatory and industry standards for operations.

The Military Munitions Response Program (MMRP) is a maturing program with different levels of regulatory oversight within each service component. Unless a service component has issued written regulations/guidance for execution of MR actions, then the default regulations/guidance followed will be those issued by the Department of Defense Explosive Safety Board (DDESB) and the U.S. Army Corps of Engineers. For commercial blasting operations, the following guidelines shall apply: ATF&E federal explosive laws and regulations (ATF P5400.7); ANSI A10.7, Safety Requirements for Transportation, Storage, Handling and Use of Explosives; and NFPA 495, Explosive Material Code.

4.3.1 General Safety Concerns and Procedures

Operations, including site visits, shall not be conducted until a complete plan for the site is prepared and approval for use is given by the CH2M HILL MR Safety/Quality Officer, MR Operations Manager, or MR Market Segment Director. These plans will be based upon the cardinal rule of explosive safety which is to limit exposure to the minimum number of personnel, for the minimum amount of time, to the least amount of explosives hazards consistent with safe and efficient operations.

Only UXO-qualified personnel shall perform MEC procedures. Non-UXO personnel may be used to perform MEC-related procedures when supervised by a UXO Technician III. All personnel engaged in field operations shall be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel shall be under the direct supervision of a UXO Technician III or a Senior UXO Supervisor (SUXOS).

4.3.2 Explosives Safety Precautions

Comply with the cardinal rule for explosives safety: expose the minimum number of people to the minimum amount of explosives for the minimum amount of time. Project-specific explosives safety precautions shall be developed prior to field activities and included in Work Plans and Health & Safety Plans that must be reviewed and approved by the MR Safety/Quality Officer and the MR Operations Manager, or in their absence the MR Market Segment Director.

4.3.3 Recognize, Retreat, and Report MEC

Any CH2M HILL project located on a present or former Department of Defense (DOD) facility, even if it is now under the control of a city, state, or private owner, should plan on the potential to encounter MEC/MPPEH. A contingency plan developed during pre-mobilization that addresses the three Rs of MEC/MPPEH (recognize the potential hazard, retreat upwind a safe distance, and report in accordance with approved plans) will lessen the impact to the project and enhance employee safety if MEC/MPPEH is encountered. Assistance in developing this contingency plan should be obtained from the MR Safety/Quality Officer, or in his absence the MR Operations Manager or the MR Market Segment Director.

4.3.4 Explosives Management

Management of explosives material under the “Safe Explosives Act of 2002” implements stringent requirements that must be followed. Management of explosives is a process that, if in compliance with federal, state, and local jurisdiction, will reduce, control, or eliminate civil and criminal penalties, disciplinary actions, and potential risk to personnel, the public, and the environment. Details of explosives management are developed on a site-specific basis and included in a site-specific Explosives Management Plan (EMP). These details are based on federal, state, and local jurisdiction requirements and on contractual specifications by the client.

4.3.5 Explosives Security

Security of explosives will conform to the requirements set forth by federal, state, and local jurisdictions. Provisions for explosives security during interstate or intrastate shipment will be performed by transportation vendors. Project site and overnight explosives security will conform to 49 CFR 171-173, transportation security requirements. Details of explosives security requirements are included in the EMP for each project.

4.3.6 Controlled Detonation Chamber Operations

A Controlled Detonation Chamber (CDC) is capable of repeated controlled detonations of a suite of energetic materials that are currently demilitarized by open burn/open detonation (OB/OD). An MR ORE is required on CDC projects. On CDC projects, the MR Operations Manager will be contacted to establish requirements.

4.3.7 Explosive Waste Disposal

When used or fired munitions are managed off range (i.e., transported off range and stored, reclaimed, treated, or disposed) or disposed of on range (i.e., buried without treatment), it is subject to regulation as a solid waste under RCRA. This means it may also be subject to

regulation as a hazardous waste. Also, munitions that land off range and are not promptly retrieved are solid wastes. Table 4-1 describes how solid wastes may be characterized as hazardous in these situations. All characterization must be based on field observations by qualified MR personnel who are trained to properly identify waste munitions items and meet the requirements for an emergency response expert under RCRA. In the event that the explosive waste is regulated as hazardous waste, refer to SOP [HSE-409, Waste Management: Hazardous Waste](#) for RCRA hazardous waste management requirements.

TABLE 4-1
Waste Characterization

Item	Characterization	Waste Code
Uncontaminated metal debris	If visual inspection determines that the item does not contain waste residue, then waste is non-hazardous scrap metal excluded from RCRA regulation under 40 CFR §261.6(a)(3). Waste may be subject to further incineration and certification requirements.	None
Contaminated metal debris	If visual inspection determines that the item contains hazardous waste residue, then manage it as potential hazardous waste.	Potential D003 and/or D008
Munitions less than 0.50 caliber	Small-arms ammunition is not considered reactive hazardous waste in accordance with EPA policy (November 30, 1984 Memorandum, John Skinner, OSWER Director).	None
Munitions greater than 0.50 caliber	Untreated MEC is presumed to be reactive hazardous waste using generator knowledge under 40 CFR §261.23.	D003

4.3.8 Forms and Permits

(1) **Type-20 Manufacturer of High Explosives License/Permit** issued by the ATF&E is required to purchase, store, and use high explosives including on-site use of binary explosives in support of MR operations, construction projects, and demolition and deactivation (D&D) projects. The following must be done prior to execution of field activities:

- Explosives will not be ordered, shipped, stored, or used by CH2M HILL without the review and approval of the ATF&E License Holder.
- The ATF&E License Holder must review and approve all Explosive Siting Plans (ESPs) and Explosives Management Plans (EMPs) to ensure compliance with ATF&E regulations.
- Following compliance with the above, the ATF&E License Holder will provide procurement/contracting with a certified copy of our Type 20 license and the authorization letter (responsible persons & possessors of explosives) to procure explosives.
- Written authorization designating the “Responsible Persons” and “Possessors of Explosives” who can order, receive, store, and use explosives must be provided by the ATF&E License Holder to explosives supplier.
- A copy of the CH2M HILL ATF&E Type 20 Manufacturer of High Explosives license must be posted on the project site.

- A copy of the ESP must be provided through the ATF&E License Holder to the ATF&E Office that inspects the CH2M HILL records and to the nearest ATF&E Office to the project site.

Additional details are provided in **Attachment 4**, Explosives Management Check List, including required records that must be forwarded to the CH2M HILL ATF&E Type 20 License Holder upon completion of work.


- (2) State and local explosives permits may be required for CH2M HILL and individuals to purchase, store, and use explosives in support of MR operations, CDC operations, construction projects, and D&D projects. In addition there may be local requirements to notify law enforcement or fire department agencies when establishing explosives storage.

5.0 Attachments

The following attachments are located within the SOP.

- Attachment 1 [Abbreviated Site Safety and Health Plan \(ASSHP\)](#)
Attachment 2 [Opportunity Risk Evaluation \(ORE\)](#)
Attachment 3 [Glossary, Acronyms, and Abbreviations](#)
Attachment 4 [Explosives Management Check List](#)

6.0 Revision Log

Revision	Date	Description	Prepared By	Approved By
1	9/27/06	Updated to Standard Operating Procedure	Dan Young	



Explosives Usage and Munitions Response (MR)
Standard Operating Procedure HSE-610

Attachment 1: Abbreviated Accident Protection Plan (AAPP)

For:

Site name _____

Site location _____

Purpose of visit _____

AAPP prepared by _____

Office _____

Address _____

Telephone _____

Date prepared _____

Signature and date _____

AAPP reviewed and approved by:

Safety office: _____ Date: _____

NOTE: This AAPP is to be used only for non- intrusive site visits or for intrusive activities (e.g. geophysical prove-outs) where anomaly avoidance is to be performed prior to intrusive activity. All team members must read and comply with this AAPP and attend the safety briefings. The UXO escort shall ensure that the Safety Briefing Checklist and Plan Acceptance Form are filled out prior to the start of the site visit.

I. Site Description and Previous Investigation

A. Site Description

☐ **Size:** _____ acres

☐ **Present usage:**

- | | | |
|---------------------------------------|---------------------------------------|----------------------------------|
| <input type="checkbox"/> Military | <input type="checkbox"/> Recreational | <input type="checkbox"/> Other |
| <input type="checkbox"/> Residential | <input type="checkbox"/> Commercial | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Natural area | <input type="checkbox"/> Industrial | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Agricultural | <input type="checkbox"/> Landfill | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Secured | <input type="checkbox"/> Active | <input type="checkbox"/> Unknown |

☐ Unsecured

☐ Inactive

B. Past Uses

All members of the site visit team have been provided with a copy of the ASR.

Yes

No –

C. Surrounding Population

☐ Rural

☐ Residential (outside base fence) ☐ Other (specify)

☐ Urban

☐ Industrial

☐ _____

☐ Commercial

☐ _____

D. Previous Sampling and Investigation Results

1. MEC Encountered within anticipated boundaries of site

2. Samples (air, water, soil, and/or vegetation)

Chemical

Concentration

Medium

Location

II. Description of On-Site Activities

☐ Walk-through

☐ Drive-through

☐ Other

☐ On-road

☐ Off-road

☐ _____

☐ On-path

☐ Off-path

☐ _____

☐ Other

☐ Other

☐ _____

III. Site Personnel and Responsibilities

Project Manager –

Office

Address

Phone _____

Responsibilities _____

Team Leader –

Office _____

Address _____

Phone _____

Responsibilities Responsible for documenting site visit.

UXO Safety Officer –

Office _____

Address _____

Phone _____

Responsibilities Responsible for all aspects of site safety during operations covered under this AAPP

IV. Hazard Analysis

A. Safety and Health Hazards Anticipated

- ☐ Chemical (be specific and include warning signs and symptoms of overexposure)
- ☐ Munitions (specify)
- | | | |
|---------------------------------------|--|--|
| <input type="checkbox"/> Heat stress | <input type="checkbox"/> Cold stress | <input type="checkbox"/> Tripping hazard |
| <input type="checkbox"/> Noise | <input type="checkbox"/> Electrical | <input type="checkbox"/> Falling objects |
| <input type="checkbox"/> Foot hazard | <input type="checkbox"/> Biological | <input type="checkbox"/> Overhead hazard |
| <input type="checkbox"/> Radiological | <input type="checkbox"/> Confined space | <input type="checkbox"/> Water hazard |
| <input type="checkbox"/> Explosive | <input type="checkbox"/> Climbing hazard | <input type="checkbox"/> Sunburn |
| <input type="checkbox"/> Flammable | <input type="checkbox"/> Other | |

B. Overall Hazard Evaluation

- ☐ High ☐ Moderate ☐ Low ☐ Unknown

Justification

V. Accident Prevention

A. General Precautions

Before the on-site visit, all team members are required to read this AAPP and sign the form acknowledging that they have read and will comply with it. In addition, the UXO Safety Officer (escort) - shall hold a brief tailgate meeting in which site-specific topics regarding the day's activities are discussed. The buddy system shall be enforced at all times. If unanticipated hazardous conditions arise, team members are to stop work, leave the immediate area, and notify the UXO Safety Officer.

VI. Standard Operation Safety Procedures, Engineering Controls, and Work Practices

A. Site Rules and Prohibitions

At any sign of unanticipated hazardous conditions, stop tasks, leave the immediate area, and notify the UXO Safety Officer. Smoking, eating, and drinking are allowed in designated areas only.

B. Material-Handling Procedures

Do not handle.

C. Drum-Handling Procedures

Do not handle.

D. Confined Space Entry

Do not enter.

E. Ignition Source and Electrical Protection

Smoke in designated areas only. Team members are not to carry matches or lighters into the site.

F. Spill Containment

N/A

G. Excavation Safety

N/A

H. Illumination

Work during daylight hours only.

I. Sanitation

Use existing sanitary facilities.

J. Buddy System

Two persons shall be on site maintaining constant contact with each other; this shall be adhered to at all times.

K. Engineering Controls

N/A

L. Heat Stress

Dress appropriately, take sufficient breaks, and drink plenty of fluids. Watch for signs and symptoms of heat stress.

M. Poisonous Snakes or Insects

- (1) Do NOT handle any snakes even those that appear to be dead.
- (2) Avoid areas of limited visibility such as tall grass or heavy vegetation.
- (3) Roll sleeves down and use insect repellent.

N. Material Potentially Presenting an Explosive hazard (MPPEH).

1. General Information

- a. The cardinal principle to be observed involving explosives, ammunition, severe fire hazards, or toxic materials is to limit the exposure of a minimum number of personnel, for the minimum amount of time, to a minimum amount of hazardous material, consistent with a safe and efficient operation.
- b. The age or condition of an munition does not decrease its effectiveness. MPPEH that has been exposed to the elements for extended periods of time becomes more sensitive to shock, movement, and friction because the stabilizing agent in the explosive may be degraded.
- c. When chemical agents may be present, further precautions are necessary. If the munitions item has green markings, leave the area immediately, since it may contain a chemical filler.
- d. Consider MPPEH that has been exposed to fire as extremely hazardous. Chemical and physical changes may have occurred to the contents which render it more sensitive than it was in its original state.

2. On-Site Instructions

- a. DO NOT touch or move MPPEH regardless of the marking or apparent condition.

- b. DO NOT visit an MPPEH site if an electrical storm is occurring or approaching. If a storm approaches during a site visit, leave the site immediately and seek shelter.
- c. DO NOT use radio or cellular phones in the vicinity of suspected MPPEH.
- d. DO NOT walk across an area where the ground cannot be seen. If dead vegetation or animals are observed, leave the area immediately due to the potential of contamination by a chemical agent.
- e. DO NOT drive a vehicle into a suspected MPPEH area; use clearly marked lanes.
- f. DO NOT carry matches, cigarettes, lighters, or other flame-producing devices into an MPPEH site.
- g. DO NOT rely on color code for positive identification of munitions or their contents.
- h. Always assume that MPPEH contains a live charge until it can be determined otherwise.

3. Specific Actions upon Locating MPPEH

- a. DO NOT touch, move, or jar MPPEH regardless of its apparent condition.
- b. The UXO Safety Officer may approach the item cautiously; take photographs and a full description. Take notes of the markings or any other identifiers.
- c. DO NOT be misled by markings on the item stating "practice bomb," "dummy," or "inert." Even practice bombs have explosive charges that are used to mark or spot the point of impact; or the item could be miss-marked.
- d. DO NOT roll the item over or scrape the item to identify the markings.
- e. The location of any MPPEH found during site investigation should be clearly marked so it can be easily located and avoided.
- f. Notify PM upon location of any MPPEH. See Section VIII for phone number.

O. Other

Specify: _____

VII. Site Control and Communications

A. Site Map

Attach copy.

B. Site Work Zones

N/A

C. Buddy System

To be adhered to at all times.

D. Communications

1. On Site

Use verbal communications among team members to communicate to each other on site. If this communication is not possible, develop and use hand signals. Here are some examples:

Hand gripping throat: "Breathing problems, can't breathe."

Thumbs up: "OK, I'm all right, I understand."

Thumbs down: "No, negative."

Hand(s) on top of head: "Need assistance."

Grab buddy's wrist: "Evacuate site now, no questions."

One long horn blast: "Evacuate site to assembly point."

Two short horn blasts: "Condition under control, return to site."

2. Off Site

Off-site communications shall be established on every site. Communications may be established by using an on-site cellular phone or by locating the nearest public or private phone that may be readily accessed. Mark the appropriate box:

☐ Cellular phone

☐ Public or private phone

☐ Other: _____

3. Emergency Signals

In the case of small groups, a verbal signal for emergencies shall suffice. The emergency signal for large groups (i.e., air horn) should be incorporated at the discretion of the UXO Safety Officer. Mark the appropriate box:

☐ Verbal

☐ Nonverbal (specify) _____

VIII. Emergency Response

A. Alert Procedures

Team members are to be alert to the hazards associated with the site at all times. If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the UXO Safety Officer. Practice MEC avoidance. If a suspected MEC is encountered during field activities, the team leader will contact local authorities and USACE Project Manager. The local authorities will contact military EOD. The suspected item will be marked with colored tape (or equivalent) by on-site UXO Safety Officer (escort).

B. First Aid

A first aid kit and emergency eyewash (as applicable) will be located in the UXO Safety Officer's field car. If qualified persons (i.e., a fire department, medical facility, or physician) are not accessible within five minutes of the site, at least one team member shall be qualified to administer first aid and cardiopulmonary resuscitation (CPR).

C. Emergency Telephone Numbers

1. Medical Facility

2. Fire Department

3. Police Department

4. Poison Control Center:

(800) 222-1222

5. Local EOD

6. Project Manager(s)

D. Hospital and Medical Facility Information

Route to hospital: (Attach a map with the route to the hospital marked; if a map is not available, then provide clear, written instructions.)

IX. Monitoring Equipment and Procedures

A. Exposure Monitoring

For non-intrusive on-site activities such as site visits, air monitoring is typically not required. However, if the site situation dictates the need for monitoring, then complete the following information on a separate page and attach the page to this AAPP.

Monitoring equipment to be utilized

Documentation of equipment calibration and results

Action levels

B. Heat and Cold Stress Monitoring

If heat stress monitoring is necessary, the monitoring criteria published in Chapter 8 of *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH/OSHA/USCG/EPA, October 1985) shall be followed. If cold stress monitoring is necessary, it shall be conducted in accordance with the most current American Conference of Governmental Industrial Hygienists (ACGIH) cold stress standard.

X. Personal Protective Equipment

A. General

Typically, for non-intrusive site visits, Level D PPE is required. Hard hats shall be worn if an overhead hazard exists, safety shoes if a foot hazard exists, and safety glasses if an eye hazard exists. If a higher level of protection is to be used initially or as a contingency, attach a brief discussion.

B. Non-intrusive Site Visit

Level of Protection

Initial: ☐ C ☐ D ☐ Modified (specify)

Contingency: ☐ C ☐ D ☐ Modified (specify)

☐ Evacuate site if higher level of protection is needed.

XI. Decontamination Procedures

If decontamination is required, attach an additional sheet with the requirements.

Decontamination procedures are not anticipated for this site investigation. Team members are cautioned not to walk, kneel, or sit on any surface with potential leaks, spills, or contamination.

XII. Training

All site personnel shall have completed the training required by EM 385-1-1 and 29 CFR §1910.120 (e). The Project Manager shall ensure, and the UXO Safety Officer shall verify, that all on-site persons have completed appropriate training prior to submitting the plan to the safety office for review. Additionally, the UXO Safety Officer shall inform personnel, before they enter the site, of any potential site-specific hazards and procedures.

XIII. Medical Surveillance Program

The Project Manager shall ensure, and the UXO Safety Officer shall verify, that all on-site personnel are in the Medical Surveillance Program meeting the requirements of 29 CFR §1910.120.

XIV. Logs, Reports, and Recordkeeping

A Site Log will be maintained by the team leader. This record will include historical data, personnel authorized to visit the site, all records, standard operating procedures, the AAPP submitted, any air monitoring logs, SOPs, and attachments to plans. All logs are to be maintained and available for inspection.

XV. General

The number of persons visiting the site shall be held to a minimum. No more than 8 people per UXO Safety Officer shall be allowed on-site. The more persons on site, the greater the potential for an accident. The UXO Safety Officer may modify this AAPP if site conditions warrant it and if it does not risk the safety and health of the team members. This modification shall be coordinated with the team members, and the UXO Safety Officer shall notify PM of the change as the situation allows.

XVI. Natural Resources

The following is a list of threatened and endangered species:

Safety Briefing Checklist

(Check subjects discussed)

Location: _____ Date: _____

General Information

Purpose of visit: _____

Identify key site personnel: _____

Training and medical requirements: _____

Specific Information

Site description and past uses: _____

Results of previous studies: _____

Potential site hazards: _____

MEC safety procedures: _____

Site SOPs: _____

Site control and communications: _____

() Emergency Hand Signals

Emergency Response: _____

() Location of First Aid Kit

() Emergency Phone Numbers and Location

() Location of Nearest Medical Facility and Location of Map to Facility

PPE and Decontamination: _____

Note: Stress the following during the briefings: If an unanticipated hazardous condition arises, stop work, evacuate the immediate area, and notify the UXO Safety Officer.

**Plan Acceptance Form:
Abbreviated Accident Prevention Plan**

For:

I have read and agree to abide by the contents of this Abbreviated Accident Prevention Plan and I have attended the Safety Briefing for the aforementioned site.

Name (printed)	Office	Signature	Date

Person presenting the safety briefing:

Signature	Date
-----------	------

Equipment List

(The following items may be necessary to support the site visit)

1. Boots or sturdy leather work shoes.
2. First aid kit.
3. Sun screen lotion.
4. Bug and/or insect repellent.
5. Rain / cold weather protection.
6. Potable water.



Explosives Usage and Munitions Response (MR)
Standard Operating Procedure HSE-610

Attachment 2: Opportunity Risk Evaluation (ORE)

1.0 Projects Involving or Potentially Involving the Use of Explosives, Materials Potentially Presenting an Explosive Hazard (MPPEH), Munitions and Explosives of Concern (MEC) and Related Activity.

Administrative Information

Project Name:
Project Number:
Project Location: (Address, City, State, Zip Code, Country)
Address:
City:
State:
Zip Code:
Country:
Project Manager - CH2M HILL:
Contracting Organization:
Client Organization:
<input type="checkbox"/> Department of Defense
<input type="checkbox"/> Department of State
<input type="checkbox"/> Department of Energy
<input type="checkbox"/> Department of Interior
<input type="checkbox"/> Other
Client Organization Name:
Contract Type
<input type="checkbox"/> Time and Materials (T&M)
<input type="checkbox"/> Cost Plus (CP)
<input type="checkbox"/> Firm Fixed Price (FFP)
<input type="checkbox"/> Target Cost Incentive Fee (TCIF)
<input type="checkbox"/> Guaranteed Fixed Price with Insurance (GFPI)
<input type="checkbox"/> Performance Based Acquisition (PBA)
<input type="checkbox"/> Other

Brief Outline of the Scope of Work.

Number and Type of MR Personnel Needed to Support Project.

Any point value of 3, 4 or 5 in Sections A, B, C or D requires that you provide a risk management strategy as indicated. If unable to do so, you may wait until the formal MR ORE is conducted, then add the agreed to strategy at that time. Examples of strategies include, engineering controls, contractual protections, procedures, insurance and bonding, etc.

Level of effort should include MR Group Safety/Quality Control Audits for project over two weeks in field.

If you are unsure of which answer to use, leave blank and the question will be evaluated at length during the MR ORE process.

Upon completion of this form, email to those identified and schedule a telephonic conference call with them to review this document.

Part A:

Common Questions for Explosives Usage, Munitions Response (MR) and Controlled Detonation Chamber (CDC) Projects

Scoring Criteria

0 = none, 1 - 2 = Low Risk 3 Moderate Risk 4 - 5 High Risk

17.A1 Type of Reactive Materials?		
Project Risk Category?	Check (x)	Point Value
Small Arms (<.50 cal) Ammunition	<input type="checkbox"/>	0
Commercial Explosives	<input type="checkbox"/>	3
Military Explosives/Energetics (bulk)	<input type="checkbox"/>	3
CWM or CWA	<input type="checkbox"/>	5
Munitions and Explosives of Concern (MEC)	<input type="checkbox"/>	5
Pyrotechnics (including fire-works, etc.)	<input type="checkbox"/>	5
RISK MANAGEMENT STRATEGY: <div style="background-color: #00FFFF; height: 15px; width: 100%;"></div>		
17.A2 Client – End Land Use		
Which factor best describes the project end land use?	Check (x)	Point Value
Like Use -	<input type="checkbox"/>	0
Not Yet Determined -	<input type="checkbox"/>	1
Limited Public Access - livestock grazing/wildlife preserve/historic area	<input type="checkbox"/>	2
Public Access - Farming/Agriculture	<input type="checkbox"/>	3
Unrestricted – Commercial	<input type="checkbox"/>	4
Unrestricted – Residential	<input type="checkbox"/>	5
RISK MANAGEMENT STRATEGY: <div style="background-color: #00FFFF; height: 15px; width: 100%;"></div>		
17.A3 Chemical Warfare Material (CWM)		
Which factor best describes this risk factor?	Check (x)	Point Value
None	<input type="checkbox"/>	0
No-specific reference - but possible	<input type="checkbox"/>	3
CW Agents Known or Suspected	<input type="checkbox"/>	5
CW Munitions Known or Suspected	<input type="checkbox"/>	5
RISK MANAGEMENT STRATEGY: <div style="background-color: #00FFFF; height: 15px; width: 100%;"></div>		

17.A4 Who will write the Work & Safety Plans?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
CH2M HILL (Who in CH2M HILL ?)	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Client / Subcontractor	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A5 Does Client acknowledge that it will retain ownership of, and responsibility for MEC & recovered items ?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A6 Does the Project Delivery Team have a history of successful execution of this type of project?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know?	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A7 Is the Client responsible for obtaining necessary permits such as utility locator, state authorizations, rights of entry, etc.?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A8 Will there be a range debris, munition debris, etc., recovery effort?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17. A9 Will CH2M HILL subcontract MR or explosive operational actions?

Which factor best describes this risk factor?	Check (x)	Point Value
No	<input type="checkbox"/>	0
Munitions Response Master Services Agreement (MSA)	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A10 For “removal” activities, will “blow-in-place” (BIP) be permitted?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A11 Is CH2M HILL responsible for the preparation of client-owned solid waste and hazwaste? (with Client's manifest)?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A12 Will we need to order explosives for this project? Who will initiate the order?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Government Furnished	<input type="checkbox"/>	1
CH2M HILL	<input type="checkbox"/>	3
UXO Contractor	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A13 Is explosives storage required and/or available on site? If yes, who provides?

Which factor best describes this risk factor?	Check (x)	Point Value
Government Provided	<input type="checkbox"/>	0
CH2M HILL	<input type="checkbox"/>	2
UXO Subcontractor	<input type="checkbox"/>	3
Unknown	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A14 Could weather conditions effect this project?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A15 Is geophysical investigation required on this project?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Geophysical Prove Out required?	<input type="checkbox"/>	3
Geophysical System Verification?	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A16 Are there public transportation routes, airport, mariners operations, rail roads, etc., within 2000 ft. to the site? If so, provide distances in feet.

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A17 Are two types of communications available on this project site? Both will need to be added to the Safety Plan and exercised prior to each day activity.

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A18 Are there emergency response services in close (5 minutes) proximity to project site (e.g., fire, hospital)?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.A19 Are there sensitive environment issues that need to be considered? Training of the UXO Technicians may be required.

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

PART B:

Explosives Usage Project Questions

17.B1 Source of explosives

Which factor best describes the source?

Check
(x)

- Vendor - Authorized ATF&E Dealer ☐
- Government Furnished ☐
- Client Furnished ☐
- Subcontractor Provided ☐
- Transferred from another CH2M HILL project ☐

RISK MANAGEMENT STRATEGY:

17.B2 Explosive operations general RISK requirements/concerns

Which factors apply to regulatory conformance risk factor?

Check
(x)

- State Blasting License (Individual) ☐
- State Blasting License (Corporation) ☐
- State Explosive Storage Permit (Fire Marshal Inspection) ☐
- Vehicle Inspection (state of registration) for hazard materials transportation ☐
- Hazard Materials License (federal and or state) ☐
- Operator – Commercial Drivers License with Hazmat Endorsement ☐
- Airport/flight paths – Notice to Airmen (NOTAM) – Airspace ☐
- Navigable Waterways – Notice to Mariners (NOTM) ☐
- Power lines/ Radar/ Microwave tower/Antenna – Electro Magnetic Radiation Hazards ☐
- Military - training corridor/area/test area/research and development area ☐
- Need to establish a Temporary Open Detonation Area ☐
- Need to establish an Explosive Holding Area ☐
- Need to establish an Explosive Inspection Area for MPPEH/MDAS ☐
- Need to establish a storage area for MEC ☐
- Need to establish a storage area for MPPEH ☐

RISK MANAGEMENT STRATEGY:

17.B3 Explosive Storage Risk Factors

Which factor best describes this risk factor - Magazine Condition?	Check (x)	Check (x)
Not Applicable.	<input type="checkbox"/>	0
Fire Inspector Permit/electrical grounding tests, ventilator and doors and locks and hasps IAW NFPA Code 495	<input type="checkbox"/>	1
Do Not Know	<input type="checkbox"/>	3
Unknown construction (material, etc.)	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.B4 Explosive Transportation

Which factor best describes this risk factor?	Check (x)	Check (x)
Not Applicable.	<input type="checkbox"/>	0
Within project area – private roads	<input type="checkbox"/>	1
Public Roads	<input type="checkbox"/>	3
Federal Roads (interstate - DOT) or over water (USCG)	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.B5 Explosive Security

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Provided by Military	<input type="checkbox"/>	1
Provided by Others	<input type="checkbox"/>	3
Don't Know	<input type="checkbox"/>	3
Provided by CH2M HILL	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.B6 Is underwater work required?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

PART C:

Munitions Response Project Questions

17.C1 Type of Munitions Response (MR) project.

Which factor best describes this risk factor?	Check (x)	Point Value
Desk top studies – no site visit	<input type="checkbox"/>	0
Escort and/or Avoidance Activities – (site visit, reconnaissance, sediment sampling, develop wells, perform O&M, land survey, area preparation, design work, etc.)	<input type="checkbox"/>	1
Construction Support – Direct Push, Trenching, Excavation, Soil Sifting, Insitu-treatment, Demolition, Land Clearing/grubbing etc.)	<input type="checkbox"/>	2
Demilitarization/ MPPEH/ Blasting/	<input type="checkbox"/>	3
Removal Action	<input type="checkbox"/>	4
Demining, Improvised Explosive Devices (IED)	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.C2 Is “over water” (on boat, bridge, etc.) work required?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Unknown	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.C3 Type of Munitions Constituents (MC) contaminated soil and/or groundwater

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Low concentrations of explosives measured in ppb/ppm.	<input type="checkbox"/>	1
High Concentrations of explosives measured in ppb/ppm.	<input type="checkbox"/>	2
High Concentrations of explosives measured in ppb/ppm - No explosive hazard.	<input type="checkbox"/>	3
Soil with 5% to 10% Energetic Material by Weight - Initiation Hazard.	<input type="checkbox"/>	4
Soil with >10% Energetic Material by Weight - Explosive Hazard.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.C4 Type of munitions demilitarization.

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Discarded Military Munitions (DMM).	<input type="checkbox"/>	1
MEC Unfuzed.	<input type="checkbox"/>	2
MEC Fuzed (BIP)	<input type="checkbox"/>	3
MD	<input type="checkbox"/>	4
Deteriorated material.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.C5 Are we to submit an Explosives Siting Plan (ESP), Explosive Safety Submission (ESS) for the Client? (CSS for RCWM).**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
No	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
Yes	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.C6 Is the Munitions Response Area (MRA) secured?**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.C7 Self Performance?**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Avoidance Support	<input type="checkbox"/>	0
Vegetation Removal	<input type="checkbox"/>	1
Geophysical Survey	<input type="checkbox"/>	2
Investigaton/MPPEH Processing	<input type="checkbox"/>	3
Removal	<input type="checkbox"/>	4
Demolition	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

PART D:

Controlled Detonation Chamber (CDC) Project Questions

17.D1 Type of MEC Hazard

Which factor best describes this risk factor?	Check (x)	Point Value
Small Arms Ammunition < 0.50 cal.	<input type="checkbox"/>	0
Demilitarization	<input type="checkbox"/>	1
MEC/MPPEH/Bulk Explosives	<input type="checkbox"/>	3
Fireworks/pyrotechnics	<input type="checkbox"/>	4
Chemical Warfare Materiel (CWM)	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.D2 Quality and Completeness of Inventory

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Inspection and Verification by CH2M HILL.	<input type="checkbox"/>	1
Inspection/Certification/Verification by Others	<input type="checkbox"/>	3
Client Statement.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.D3 MEC/MPPEH

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Meets CDC ESS limitations	<input type="checkbox"/>	1
CWM	<input type="checkbox"/>	3
Munitions requiring disassembly (i.e., water cutting, etc.)	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

17.D4 Will CH2M HILL provide CDC operator services?

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.D5 If CDC leased to Owner, will CH2M HILL train Client operators?**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.D6 Will Owner accept CH2M HILL rejection of MEC deemed unsuitable for CDC destruction?**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:**17.D7 Are all items of type, size and condition previously destroyed in CDC?**

Which factor best describes this risk factor?	Check (x)	Point Value
Not Applicable.	<input type="checkbox"/>	0
Yes.	<input type="checkbox"/>	1
Don't Know	<input type="checkbox"/>	3
No.	<input type="checkbox"/>	5

RISK MANAGEMENT STRATEGY:

Attachment 3: Glossary, Acronyms, and Abbreviations

Active munitions inventory (or stockpile): The supply of chemical and conventional military munitions that is available for issue and use for combat, training, demonstrations, research, development, testing, or evaluation. (See **munitions stockpile** and **demilitarization inventory**.)

Active range: An operational military range that is currently in service and being regularly used for training, demonstrations, research, development, testing, or evaluation.

AEDA: ammunition, explosives, and dangerous articles.

Anomaly avoidance: Techniques employed by EOD or UXO personnel at sites with known or suspected MEC to avoid any potential surface MEC or subsurface anomalies. This usually occurs at mixed-hazard sites when HTRW investigations must occur before an MEC removal action is executed. Intrusive anomaly investigations are not authorized during MEC avoidance operations.

Anomaly: Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and nonferrous material at a site.

AP: armor piercing: Munitions that may or may not contain HE and are designed to penetrate hard targets.

APERS: antipersonnel munitions: May be loaded with high explosives or incendiary fillers and are designed to kill, wound, or obstruct personnel.

APT: armor-piercing tracer: Munitions, designed to penetrate hard targets, that contain a pyrotechnic element that produces bright light and/or smoke to aid in visual tracking of the munitions in flight.

ATV: all-terrain vehicle.

Authorized Visitors: Government or contractor personnel conducting project or mission related functions, e.g., Quality Assurance Representatives (QAR's) safety and quality inspectors (including geophysicists performing quality assurance functions) and project management. Authorized visitors must be escorted while in the EZ and be approved for entry into the EZ. No more than two visitors will be permitted in the EZ at any one time.

BD: base detonating: Impact fuze designed to function when the projectile comes in contact with the surface of the target. The fuze is located in the base or tail of the munitions.

bgs: below ground surface.

BRAC: Base Realignment and Closure.

CAD: cartridge-actuated device: An explosive device designed to produce gas pressure to expel or eject an item.

Cal: caliber: The diameter of a projectile or the bore of a weapon (i.e., .50-cal, 3-inch, 90-millimeter).

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act.

Chemical Warfare Materiel (CWM): An item configured as ammunition, containing a chemical substance intended to kill, seriously injure, or incapacitate a person through its physiological effects. Also includes V- and G-series nerve agents, H-series blister agent, and lewisite in other-than-munitions configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include riot control agents, chemical herbicides, smoke- and flame-producing items, or soil, water, debris, or other media contaminated with a chemical agent.

Closed range: A military range that has either been taken out of service as a range and has been put to new uses that are incompatible with range activities, or that is no longer considered to be a potential range area. A closed range is still under the control of a DOD component.

Construction support: Support provided by qualified UXO personnel during construction activities at potential MR sites to ensure the safety of construction personnel from the harmful effects of MEC. When it is determined that the probability of encountering MEC is low (current or previous land use leads to a determination that MEC may be present), a two-person UXO team will stand by in case the construction contractor encounters a suspected MEC. When it is determined that the probability of encountering a MEC is moderate to high (current or previous land use leads to a determination that MEC was employed or disposed of in the parcel of concern, e.g., open burn and open detonation areas), UXO teams are required to conduct subsurface MEC clearance for the known construction footprint, either in conjunction with the construction contractor or before construction.

Controlled Detonation Chamber (CDC): The CDC is a system for controlled detonation of MEC and MEC-related materials. It is capable of repeated controlled detonations of a suite of energetic materials that are currently demilitarized by OB/OD. This offers the DOD an alternative to OB/OD while at the same time increasing throughput, efficiency, and safety and controlling air, soil, water, and noise pollution. The CDC system meets all state and federal air discharge regulations.

CQC: Contractor Quality Control.

CTT: closed, transferring, and transferred (refers to a subset of military ranges).

DAC: Defense Ammunition Center.

DDESB: Department of Defense Explosives Safety Board.

DERP: Defense Environmental Restoration Program.

Demilitarization (“demil”): The process that removes the military characteristics from unused munitions that are either unsuitable for continued storage, excess to DOD needs, or

about to be released from DOD control. Demilitarization applies equally to munitions in unserviceable or serviceable condition. Used (i.e., fired) munitions items also sometimes undergo demilitarization. There are many demilitarization methods, such as recovery, recycling, remanufacture, disassembly, reclamation, mutilation, alteration, melting, burning, detonating, destruction, treatment, and disposal. Methods involving R3 currently constitute approximately two-thirds of the DOD demilitarization programs.

Demilitarization (demil) inventory: The demilitarization inventory consists of excess, obsolete, and unserviceable munitions. Munitions are moved from the active inventory to the demilitarization inventory after it is determined that they are not economically repairable, they are obsolete, or they are excess to DOD needs and cannot be sold under the Foreign Military Sales program. (Also see **active munitions inventory** and **munitions stockpile**.)

DENIX: Defense Environmental Network and Information Exchange.

Department of Defense Components: The Office of the Secretary of Defense, the Military Departments and Services, the Joint Staff, the Unified and Specified Combatant Commands, the Defense Agencies, the DOD Field Activities, and the National Guard.

Department of Defense Explosives Safety Board (DDESB): A Joint Service board comprising a chairperson, voting representatives from each of the Armed Services, and a permanent military and civilian secretariat to perform operational and administrative functions. The DDESB provides impartial and objective advice to the Secretary of Defense and DOD components on explosives safety matters. (See DOD 6055.9-STD for a detailed assignment of DDESB functions.)

DGPS: differential global positioning system.

Discarded Military Munitions (DMM): Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

DLA: Defense Logistics Agency.

DMM: discarded military munitions.

DOD: U.S. Department of Defense.

DODD: Department of Defense Directive.

DODIG: Department of Defense Inspector General.

DOI: U.S. Department of Interior.

DRMO: Defense Reutilization and Marketing Office.

DRMS: Defense Reutilization and Marketing Service.

EBS: environmental baseline survey.

Emergency Response (to munitions- or explosives-related or UXO emergencies): An immediate response by explosives and munitions emergency response personnel (i.e., DOD EOD personnel) to control, mitigate, or eliminate the actual or potential threat encountered during an explosives or munitions emergency. The response action may include in-place or on-site render-safe procedures, treatment, or destruction of the explosives or munitions or their transport to another location where these operations may be conducted. (See 40 CFR Part 260 et seq., the Military Munitions Rule.)

Energetic material: A component or item of ammunition that is designed to produce the necessary energy required for ignition, propulsion, detonation, fire, or smoke, thus enabling the item to function. Also a material (e.g., corrosive or oxidizer) that is inherently dangerous and capable of causing serious damage and that requires regulated handling to avoid accidents in connection with its existence and use.

EOD: Explosive Ordnance Disposal.

EPA: U.S. Environmental Protection Agency.

EPCRA: Emergency Planning and Community Right-to-Know Act.

ERGM: extended-range guided munitions.

ESCA: Environmental Services Cooperative Agreement.

ESOH: Environmental, Safety, and Occupational Health.

ESOHPB: Environmental, Safety, and Occupational Health Policy Board.

Essential personnel. Personnel whose duties require them to remain within an ESQD arc for one or more of the following reasons:

- a. Government and project personnel necessary for the safe and efficient completion of field operations conducted in an EZ. This is limited to: contractor work teams members including the Unexploded Ordnance (UXO) Safety Officer (UXOSO), UXO Quality Control Specialist, Senior UXO Supervisor and a USACE Ordnance and Explosives (OE) Safety specialist.
- b. Personnel not UXO qualified must be identified in the work plan by name and/or position.

ESTCP: Environmental Security Technology Certification Program.

Exclusion Zone (EZ): A safety zone established around an MR work area. Only project personnel and authorized, escorted visitors are allowed within the EZ. Examples of EZs are safety zones around MEC-intrusive activities and safety zones where MEC is intentionally detonated. (See DDESB-KO, 27 January 1990.)

Explosive Equivalent. The amount of a standard explosive which, when detonated, will produce a blast effect comparable to that which results at the same distance from the detonation or explosion of a given amount of the material for which performance is being evaluated. It is usually expressed as a percentage of the total net weight of all reactive materials contained in the item or system. For the purpose of this manual, TNT is used for comparison.

Explosive Ordnance Disposal (EOD): Includes detecting, identifying, field evaluating, rendering safe, and final disposing of MEC.

Explosive Ordnance Disposal (EOD) Personnel: Military members who have graduated from the Naval School, EOD. They have received highly specialized training to provide time-critical MEC hazard mitigation services during both peacetime and wartime. EOD personnel are trained and equipped to perform render-safe procedures (RSP) on nuclear, biological, chemical, conventional, and improvised explosive devices. (Note that EOD personnel are distinguished from UXO Technicians, who are civilian contractor or government personnel with specialized training and qualifications in the long-term remediation of MEC.)

Explosive Safety Quantity Distance (ESQD): The prescribed minimum distance between sites storing or handling hazard Class 1 explosive material and specified exposures (i.e., inhabited buildings, public highways, public railways, other storage or handling facilities, or ships, aircraft, etc.) to afford an acceptable degree of protection and safety to the specified exposure. The size of the ESQD arc is proportional to the NEW present.

Explosive Safety Submission (ESS): The document that serves as the specifications for conducting work activities at the project. The ESS details the scope of the project, the planned work activities, potential hazards, and the methods for their control.

Explosive Siting Plan (ESP): The document that serves as a DDESB Permit approving the site-specific storage locations, quantities, and safe distances for explosive operations.

Explosive soil: Mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive. The following also defines an explosive soil: The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether an explosive is classified as “primary” or “secondary.” Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include lead azide, lead styphnate, and mercury fulminate. Secondary explosives are bursting and boosting explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. Soil containing 10 percent or more by weight of any mixture of secondary explosives is considered “explosive soil.” Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosion hazards.

°F: degrees Fahrenheit.

FAR: Federal Acquisition Regulations.

FFA: Federal Facilities Agreement.

FFCA: Federal Facilities Compliance Act.

FOST: finding of suitability to transfer.

Frag: fragment or fragmentation: Munitions material projected away from the point of detonation at a high velocity.

Free from explosive hazard: Material that has been inspected for explosives and determined not to present a danger of explosion or combustion from explosive or energetic materiel.

FUDS: formerly used defense site.

GIS: geographic information system.

GPS: global positioning system.

Hazardous waste: A solid waste that meets the following criteria: (1) is or contains a hazardous waste listed in 40 CFR Part 261, or (2) exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. (Refer to 40 CFR § 261.3 for further explanation.)

HE: high explosive: Explosive that normally detonates rather than burns.

HEAT: high-explosive antitank: Munitions designed to defeat armor by the use of a shaped charge.

HEI: high-explosive incendiary: High-explosive-filled munitions with additional ingredients to give a fire-producing effect.

HQMC: Headquarters, U.S. Marine Corps.

ICM: improved conventional munition.

Impact area: The identified area within a range intended to capture or contain ammunition, munitions, or explosives and resulting debris, fragments, and components from various weapon system employments. In simple terms, normally the target area where live-fire rounds or bombs impact the earth.

Improved Conventional Munition (ICM): ICMs or submunitions, cluster bombs, and cargo rounds are considered sensitive-fuzed munitions and require special authority to enter contaminated areas.

Inactive range: An operational military range that is not currently being used but is still under military control, and which the military both considers to be a potential range area and has not put to a new use that is incompatible with range activities. A potential range area is defined as meeting one of three criteria:

- (1) Mobilization and force projection: ranges that are held by a DOD component for the purpose of preparing individuals and units for worldwide deployment, redeployments, or demobilization in response to war, stability, and support operations or projected training requirements that would exceed current active range capabilities;
- (2) Force structure: ranges held as inactive during realignment, reorganization, stationing, or reequipping of units projected to use these ranges under new training requirements; or
- (3) Future: ranges that are held by DOD components for future use in support of National Security Policy or DOD component doctrine that ensures the capability to produce, establish, and maintain conditions needed for operational success.

Inhabited Building Distance (IBD): The minimum distance permitted between an inhabited building and an ammunition or explosives location for the protection of

administration, quarters, industrial, and other similar areas within a naval shore establishment. Inhabited building distances shall be provided between ammunition or explosives locations and the boundary of a shore establishment of the nearest point beyond the boundary where such inhabited structures could be erected.

Integrated Training Area Management (ITAM): A U.S. Army program designed to improve range conditions by inventorying and monitoring land conditions, determining carrying capacity of the land in terms of the training requirements, and providing for land rehabilitation and maintenance measures.

Intentional detonation: An intentional detonation is a planned, controlled detonation.

Intrusive activity: An activity that involves or results in the penetration of the ground surface at an area known or suspected to contain MEC. Intrusive activities can be of an investigative or removal action nature.

IR: Installation Restoration.

ITAM: Integrated Training Area Management (a U.S. Army program).

JOCG: Joint Ordnance Commanders Group.

JUXOCO: Joint UXO Coordination Office.

MDAS: MPPEH that has been assessed and documented as not presenting an explosive hazard and for which the chain of custody has been established and maintained. This material is no longer considered to be MPPEH.

MDEH: MPPEH that has been assessed and documented as to the explosive hazards the material is known or suspected to present and for which the chain of custody has been established and maintained. This material is no longer considered to be MPPEH.

Material that Potentially Presenting an Explosive Hazard (MPPEH): Military munitions, including: their components; munitions packaging material; residues from research, development, testing, and evaluation (RDT&E), production, use (to include range scrap), operational and quality testing, or demilitarization of munitions; or any other materials, equipment, or facilities potentially contaminated with explosives. MPPEH includes both end items and residues derived from processing end-items within United Nations Organization (UNO) Hazard Class (HC). It also includes munitions-related items, pieces, models, training aids, etc., that are suspected but not confirmed to be wholly inert.

Maximum Credible Event (MCE): The worst single event that could occur at any time with maximum release of a chemical agent from a munition, container, or process as a result of an unintended, unplanned, or accidental occurrence.

MEC: munitions and explosives of concern. Distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded Ordnance (UXO), (B) Discarded military munitions (DMM), (C) Munitions Constituents (MC).

MIL SPECS/STDS: military specifications and standards.

Military Munitions (MM): All ammunition products and components produced or used by or for the DOD or the U.S. Armed Services for national defense and security, including

military munitions under the control of the DOD, the U.S. Coast Guard, the U.S. DOE, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries used by DOD components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. It does not include: wholly inert items; improvised explosive devices; and nuclear weapons, devices, and components thereof. However, it does include nonnuclear components of nuclear devices, managed under DOE's nuclear weapons program after all required sanitation operations under the Atomic Energy Act of 1954, as amended, have been completed.

Military Range: A designated land or water area set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas.

MLLW: mean lower low water.

Most Probable Event (MPE): The most likely event, as a result of an accidental, unplanned, or unintended detonation of an item of munitions, that could occur during MR activities. The event must be realistic, with reasonable probability of occurrence.

MPPEH: munitions that potentially presenting an explosive hazard.

MT: Mechanical time: fuzes designed usually for airburst. MT fuzes are located in the nose of the munition.

Munitions and Explosives of Concern (MEC): Military munitions that are UXO or have been abandoned, as defined in the EPA Munitions Rule. Also includes soil, facilities, equipment, or other materials contaminated with a high enough concentration of explosives that it presents an explosive hazard.

Munitions Constituents (MC): Any materials originating from military munitions, including explosive and/or non-explosive materials, and emission, degradation, or breakdown products. [The following additional explanation is offered for purposes of this SOP: Munitions constituents are the substances or chemical residues that result from the proper functioning or use of munitions (e.g., residues created and remaining in the soil, water, or air from the burning or explosion of energetic material) or that are present in MEC. Such constituents may or may not present an immediate risk of acute physical injury from fire or explosion resulting from accidental or unintentional detonation or ignition of MEC or energetic materials. Similarly, such constituents may or may not result in environmental contamination requiring a response (i.e., response action).]

Munitions Debris (MD): Metal fragments resulting from the intended use of munitions or detonations.

Munition with the Greatest Fragmentation Distance (MGFD). The munition with the greatest fragment distance that is reasonably expected (based on research or

characterization) to be encountered in any particular munition response area (MRA) or munitions response site (MRS).

Munitions Response Area (MRA): Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS): A discrete location within a MRA that is known to require a munitions response.

Munitions Rule Implementation Policy: Detailed guidance and procedures issued by the Services that explains how DOD will implement and comply with the EPA Military Munitions Rule.

Munitions stockpile: Munitions in the active and demilitarization inventories as well as unused waste munitions as defined in the EPA's Military Munitions Rule (MMR). (See **active munitions inventory** and **demilitarization inventory**.)

Munitions: see **military munitions**.

Net Explosive Weight (NEW): The actual weight of explosive mixture or compound including the TNT equivalent of other energetic material which is used in the determination of explosive limits and ESQD arcs.

Non-stockpile Chemical Warfare Materiel: CWM (defined above) that is not included in the chemical stockpile. Non-stockpile CWM is divided into five categories: (1) buried CWM; (2) recovered chemical weapons (items recovered during range clearing operations, from chemical burial sites, and from research and development testing); (3) former chemical weapon production facilities; (4) binary chemical weapons; and (5) miscellaneous CWM (unfilled munitions and devices and equipment specially designed for use directly in connection with employment of chemical weapons).

OB: open burn.

OCR: Office(s) of Collateral Responsibility.

OD: open detonation.

ODEP: Office of Defense Environmental Programs.

ODUSD (I&E): Office of the Deputy Under Secretary of Defense (Installations and Environment).

OE Safety Specialist: a USACE employee involved in the execution, supervision, or oversight of munitions-related activities inside the exclusion zone who has graduated from the U.S. Naval EOD School, Indian Head, MD. An OE Safety Specialist shall be on-site each day during intrusive and MEC destruction activities. The OE Safety Specialist is on-site to ensure that the contractor establishes the appropriate daily safety routines at the beginning of UXO field operations, to perform quality assurance oversight, to verify contractor employee UXO qualifications, to advise the contractor on UXO procedures, to coordinate with the PM, and to facilitate EOD response when needed.

OEESCM: Operational and Environmental Executive Steering Committee for Munitions.

Open Burn (OB): A controlled open-air process by which excess, unserviceable, and obsolete munitions are destroyed to eliminate their inherent explosives safety hazards. DOD OB units contain the munitions with pans or pads to minimize environmental contamination. DOD OB units are permitted as “miscellaneous units” in EPA’s environmental permitting process.

Open Detonation (OD): A process used for the treatment of unserviceable, obsolete, and/or waste munitions whereby an explosive donor charge initiates the munitions to be detonated. Although surface detonations can be performed under certain circumstances, most munitions are treated in 4- to 6-foot-deep pits for safety purposes. Most OD sites are permitted as miscellaneous units as part of the EPA environmental permitting process. DOD’s units are generally permitted as combined OB/OD facilities.

Operational range: A military range that is currently under military control and management; includes both active ranges (currently in service or use) and inactive ranges (not in current use or service).

OPR: Office(s) of Primary Responsibility.

OSD: Office of the Secretary of Defense.

OU: Operable Unit.

OUSD (AT&L): Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics).

PD: point detonating: impact fuze, designed to function when the projectile comes in contact with the surface of a target; located in the nose of the munition.

Potential Explosion Site (PES): The location of a quantity of explosives that will create a blast, fragment, thermal, and/or debris hazard in event of an accidental explosion of its contents. Quantity limits for ammunition/explosives at a PES are determined by the distance to an exposed site.

POL: petroleum, oil, and lubricants.

PPE: personal protective equipment.

Primer: Small, sensitive explosive component used as the first element in the explosive train.

Proj: projo or projectile: A weapon that is projected through a tube or barrel into the air toward a target.

PSE: preliminary source evaluation.

PTT: powder train time fuse: Fuses designed usually for airburst, normally used with illumination rounds to light up the battlefield.

QA: quality assurance.

QC: quality control.

Quantity-Distance (Q-D): the quantity of explosives material and distance separations that provide defined types of protection. These relationships are based on levels of risk

considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables provided in DOD 6055.9-STD. Separation distances are not absolute safe distances but are relative protective safe distances. Greater distances than those shown in the Q-D tables shall be used whenever possible.

R&D: research and development.

RAB: Restoration Advisory Board.

RAC: Remedial Action Contract.

Range clearance: An operation or procedure conducted to remove and properly dispose of munitions or munitions fragments. (e.g., MEC, “duds,” etc.). Several types or degrees of clearance may be conducted (e.g., surface clearance based on visual inspection of the surface; shallow clearance where an area is systematically swept with detectors – normally to a depth of 20-24 inches; etc.) Range clearance, though technically applicable to any range category (closed, transferred, active, etc.) is often considered as occurring only at active, operational ranges. Clearance operations at these active ranges are normally conducted as part of range maintenance activities to maintain or enhance operational safety conditions at the range facility. Even though it is possible for MEC to cause environmental contamination (pollution of soil, surface water, groundwater, etc., from the chemical constituents present in munitions), range clearance is focused on removing and safely disposing of munitions items or fragments – not the removal or treatment of any chemical residues or constituents from the munitions or associated environmental contamination. Cleanup of environmental contamination or pollution is normally achieved by removal or remedial actions.

Range: see **military range**.

RCRA: Resource Conservation and Recovery Act.

RCWM: recovered chemical warfare material.

RDT&E: research, development, test, and evaluation.

Regional Environmental Coordinator (REC): A senior military officer or DOD civilian assigned to one of ten EPA regions who is responsible for the dissemination of information and coordination of environmental matters and public affairs among military installations and environmental regulatory organizations within their respective region. RECs have a liaison role and fully adhere to the Services’ chain of command.

Remedial Action/Removal Action process: Longer-term activities that complete the cleanup of contamination (or a contaminated site or location) if a removal action has not achieved or cannot achieve the required degree of cleanup for the contamination problem. A distinction is sometimes made between the control or cleanup measures to be implemented, which are called “remedial actions,” and the identification, evaluation, decision-making, and design and construction steps required to implement the control measures. These steps collectively are called the “remedial action process.”

Removal Action(s): Relatively quick actions designed to address imminent threats to human health and the environment posed by releases or spills of hazardous substances. Removals should satisfy one or more of the following tests:

- (1) **Imminent threat:** the site or situation poses an imminent threat to public health.
- (2) **Source control:** the removal action either removes the source of contamination off-site or effectively contains it on-site so that continuing releases to the environment are prevented or reduced.
- (3) **Access limitation:** the removal action substantially reduces the possibility of human exposure to hazardous substances. The EPA has categorized removal actions as emergency, time-critical, and non-time-critical. Each of these categories possesses its own criteria and procedural requirements.

Resource recovery and recycling (R3): Technologies and processes used by DOD to demilitarize military munitions. These include reuse, sale “as is” (e.g., Foreign Military Sales), conversion to a commercial product for sale or industrial use, or disassembly, modification, and partial or whole use for a military application.

Response(s) or Response Action(s): Responses or response actions are broadly defined in environmental law and regulations as any scientific or engineering investigation, evaluation, decision-making, design, or implementation step taken in response to (i.e., to clean up) a release or spill of hazardous substances. Removals and remedial actions (or remedial action processes) are subcategories of response actions. Procedural requirements (established in environmental regulations) for these two types of actions differ substantially, but their definitions are almost as broad as for “responses,” allowing the terms to be used almost interchangeably. The various terms are best defined by the procedural requirements imposed on them by the applicable environmental regulations.

RI/FS: remedial investigation/feasibility study.

ROD: Record of Decision.

Senior UXO Supervisor (SUXOS): Supervises all contractor on-site UXO activities. This individual must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD, or the U.S. Naval EOD School, Indian Head, MD. Must have at least 10 years of combined active-duty military EOD and contractor UXO experience, to include at least 5 years in supervisory positions.

SERDP: Strategic Environmental Research and Development Program.

SHPO: State Historic Preservation Officer.

Single Manager for Conventional Ammunition (SMCA): A DOD executive agent responsibility performed by the U.S. Army Operations Support Command. The Secretary of the Army is DOD’s SMCA. The U.S. Army OSC is the day-to-day operator of the SMCA and serves as the central program manager for the execution of most of DOD’s demilitarization requirements. The objectives and responsibilities of the SMCA can be found in DOD Directive 5160.65.

Sustainable Range Management: Management of a military range in a manner that supports national security objectives and maintains the operational readiness of the Armed Forces and ensures the long-term viability of the range while protecting human health and the environment. [The following additional explanation is offered for purposes of this SOP:

A comprehensive DOD approach that develops and implements the policies, plans, practices, and procedures necessary to achieve sustainable ranges. Sustainable ranges are managed and operated in a manner that supports their long-term viability and utility to meet the national defense mission. Sustainable ranges will implement the planning, management, coordination, and public outreach necessary to ensure viable continuity of test and training operations and long-term coexistence with neighboring communities and natural ecosystems.]

Sustainable use: Actions taken to ensure that ranges maintain the ability to conduct training, research, development, testing, and evaluation of munitions in support of the national defense mission while minimizing adverse effects to human health and the environment.

SUXOS: Senior UXO Supervisor.

SWMU: solid waste management unit.

TNT equivalent: Considering the peak overpressure produced by detonation of a given weight of TNT as 100 percent, the TNT equivalency of an explosive is the amount of overpressure produced by detonation of an identical quantity of propellant under comparable conditions, expressed as a percentage.

Transferred range: A military range that is no longer under the control of a DOD component and has been leased, transferred, or returned to another entity (including other federal, non-DOD entities) for use.

Transferring range: A military range that is proposed to be leased or transferred from DOD to another entity or disposed of by conveying title to a non-federal entity. An active range will not be considered a “transferring range” until the transfer is imminent.

TRI: Toxic Release Inventory (required by the EPCRA).

Unexploded ordnance (UXO): Military munitions that have been primed, fuzed, armed, or otherwise prepared for use and that have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or materiel and that remain unexploded by malfunction, design, or any other cause. UXO presents an immediate risk of acute physical injury from fire or explosion resulting from accidental or unintentional detonation.

Unintentional detonation: A detonation not planned in advance.

USACE: U.S. Army Corps of Engineers.

Used or fired military munitions: Those military munitions that meet the following criteria: (1) have been primed, fuzed, armed, or otherwise prepared for use, and have been fired, dropped, launched, projected, placed, or otherwise used; (2) munitions fragments, (e.g., shrapnel, casings, fins, and other components, to include arming wires and pins) that result from the use of military munitions; or (3) malfunctions or misfires (e.g., fail to properly fire or detonate).

USFWS: U.S. Fish and Wildlife Service.

USGS: U.S. Geological Survey.

UST: underground storage tank.

UTM: Universal Transverse Mercator.

UXO: unexploded ordnance.

UXO personnel: Contractor personnel who have completed specialized military training in EOD methods and have satisfactorily performed the EOD function while serving in the military. Various grades and contract positions are established based on skills and experience.

UXO Quality Control Specialist (UXOQCS): Contractor personnel with the responsibility of enforcing the contractor's Quality Control Program for all MR-related evolutions; conducting quality control inspections of all UXO and explosives operations for compliance with established procedures; and directing and approving all corrective actions to ensure that all MR-related work complies with contractual requirements.

UXO Safety Officer (UXOSO): Contractor personnel with the responsibility of enforcing the contractor's SSHP. This individual must, therefore, be in the field whenever possible to observe operations. Must have the same minimum qualifications as the UXO Technician III. In addition, must have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements.

UXO Technician II: must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD; the U.S. Naval EOD School, Indian Head, MD; U.S. Naval EOD School, Eglin AFB, FL; or a DOD-equivalent certified course. Must have a minimum of five years of military EOD or contractor UXO experience.

UXO Technician III: supervises a UXO team. Must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD; the U.S. Naval EOD School, Indian Head, MD; U.S. Naval EOD School, Eglin AFB, FL; or a DOD-equivalent certified course. This individual must have a minimum of ten years of military EOD or contractor UXO experience.

UXO: unexploded ordnance.

UXOQCS: UXO Quality Control Specialist.

UXOSO: UXO Safety Officer.

Waste Military Munitions: A military munition that is a solid waste per 40 CFR §266.202. Such a waste military munition may also be a hazardous waste if it meets the definition found in 40 CFR §261.3. Waste munitions are hazardous wastes when they exhibit the hazardous waste characteristic of ignitability, corrosivity, reactivity, or toxicity, or are listed as hazardous wastes.

WP: white phosphorus: A screening smoke that burns on contact with air and can be used as an incendiary.



Explosives Usage and Munitions Response (MR)
Standard Operating Procedure HSE-610

Attachment 4: Explosives Management Check List

Date	Check List Item	PM Date Completed	MR Ops Review Date	MR QC NTP Date
	Contract Terms and Conditions			N/A
	Scope of Work			N/A
	Completed: Opportunity Risk Evaluation (ORE), Paragraph 17 MR Projects and CDC Projects			
	Explosive Management Plan (*)			
	Explosive Siting Plan (*)			
	Obtain State/local (if required) Explosive Permit* for CH2M HILL to use high explosives within the state and or local jurisdiction.			
	Obtain State/local (if required) Permit* for CH2M HILL to site explosives magazine within the state and or local jurisdiction.			
	Identify CH2M HILL HILL HILL licensed Blaster* (if self- performing)			
	CH2M HILL ATF&E "Request to Order Explosives" form for Review and obtain authorization signature of ATF Permittee			
	Original signature of ATF&E Type 20 Explosives Manufacture License* from CH2M HILL License Holder			
	"Authorization Letter*" identifying "Responsible Persons" and "Possessor of Explosives" that are authorized to order, receive, store, and use explosives under the CH2M HILL ATF&E Type 20 Explosives Manufacturer License			
	Vender Identified by contracting (If sole source - justification is required)			N/A
	Vender required to provide a copy of their ATF&E License* to CH2M HILL ATF&E files			
STOP!!! MANDATORY MUNITIONS RESPONSE QC CHECK				
	Purchase Order* provided to vender with a copy of ATF&E Type 20 Manufacturer of High Explosives License, with endorsement			

Date	Check List Item	PM Date Completed	MR Ops Review Date	MR QC NTP Date
	Purchase Order* provided to vender with Authorization Letter for Responsible Persons and Employee Possessor of Explosives			
	Award the purchase order to the selected vender - - Hold authorization for Vendor to ship explosives			
	Notify Vendor of CH2M Possessor of Explosives authorized to receive explosives at the project site, telephone number and address of receiving location			
	Vender accepts purchase order and holds for contracting release of explosives shipment			
	Vender identifies carrier and provides a shipment schedule with copy of manifest* to CH2M HILL contracting and contracting notifies the Project Manager			
	Establish Explosives Storage Area (Security, Lightening Protection, Grounding)			
	Schedule State and or local jurisdiction site inspection for "Explosive Storage" (Magazines) if required.			
	Magazine storage area inspected and approved* for storage by local jurisdictions (if required).			
	CH2M HILL contracting notifies vender to release explosives shipment			
	Notify ATF&E servicing office for CH2M HILL ATF&E License*, local ATF&E office*, and local jurisdictions* of storage of explosives and provide an Explosives Siting Plan that includes ATF Form 5400.13/5400.16, Explosives Storage Magazine Description Worksheet* (as required).			
	Post CH2M HILL ATF&E Type 20 License on the project site			
	CH2M HILL "Responsible Person" or Possessor of Explosives" person receives shipment (presents identification to transporter, verifies manifest, and inventories shipment to ensure accuracy between purchase order and manifest. Discrepancies should be resolved IAW the project Explosive Management Plan)			
	Explosive materials are properly inventoried (date shift codes, acquisition dealer, license address, POC), and stored IAW project Explosives Management Plan			
	Material Safety Data Sheets (MSDS) for explosives materials are on-site			

Date	Check List Item	PM Date Completed	MR Ops Review Date	MR QC NTP Date
	Magazine Data Cards (Daily Summary of Magazine Transactions*) are completed and maintained IAW project Explosives Management Plan			
	Magazine has two mortise type 5 (or equivalent) pin high security locks			
	Security Checks conducted a minimum of every 72 hours and documented or IAW work plan approved methods*			
	Responsible person or possessor of explosives has control of keys to magazines (IAW local procedures).			
	Daily Usage (Shot) Log* maintained for expenditure of explosive materials including target materials			
	Weekly inventories of all explosives materials conducted and documented*			
	PM to notify local jurisdictions and ATF&E offices when explosives materials are no longer being stored*			
	*Project Manager to provide to the ATF&E License Holder completed purchase orders, manifest documents, inventories, magazine data cards, usage logs, and any other associated information for ordering, storage and use of explosives material along with an end user certification that all explosives materials have been accounted for.			
	MR Safety Officer shall conduct a quality control audit of the project explosives management plan with ATF&E requirements and report on the conformance of the Project Manager & License Holder.			
	* Indicates documents that upon completion of project will be forwarded to the License Holder and copy to Safety Office			

REQUEST to ORDER EXPLOSIVES		
Instructions: Enter information for the procurement of one (1) Explosive Class/Product Trade Name per request form.		
Block 1.	Block 2.	Block 3.
Project Name	Project Number	Date of Request mm/dd/yyyy
Block 4.	Block 5.	Block 6.
Project Manager (First, Middle, Last)	Office Location/Symbol	Project Manager Telephone Number
Block 7.	Block 8.	Block 9.
Delivery Date mm/dd/yyyy	Delivery Address	Delivery Telephone Number
Street		Block 10.
City		Receiving Person (First, Middle, Last)
County/province		
State		Block 11.
Postal Code		Receiving Person Telephone Number
Country		
Block 12.	Block 13.	Block 14.
Vendor/Supplier/Organization	Vendor ATF License	Vendor ATF License
Block 15.	Block 16.	Block 17.
Vendor/Supplier/Organization		Vendor Telephone Number
Street		
City		Block 18.
County/province		Vendor Point of Contact Person
State		
Postal Code		Primary Tel. #:
Country		2nd Tel. #:
Block 19.	Block 20.	Block 21.
Product Trade Name	Product Unit of Issue (EA, LB, FT, RL, BX)	Product Quantity Requested (Number)
Block 22.	Block 23.	Block 24.
Vendor Lot Number	Vendor Date Shift Code	Vendor MSDS Product Name
Block 25.	Block 26.	Block 27.
DOT EX Number	UN Number	DOT Hazard Class/Division
Block 28.	Block 29.	Block 30.
Estimated Product Cost	Estimated Shipping Cost	Estimated Total Cost
AUTHORIZATION FOR PURCHASING TO ORDER EXPLOSIVES		
ATF Licensee Signature		
Date		